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EPA Project Officer: Diana King
EPA Remedial Project Manager: Dave Lederer

INTERIM FINAL
REMEDIAL INVESTIGATION REPORT

Hatheway & Patterson Site
Mansfield, Massachusetts

Volume I

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Prepared By:

Metcalf & Eddy, Inc.
701 Edgewater Drive
Wakefield, MA 01880

Team Subcontractor
TRC Environmental Corporation
Boott Mills South
Foot of John Street
Lowell, MA 01852

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1.0 Introduction

Metcalf & Eddy of Wakefield, Massachusetts (M&E) received Work Assignment (WA) No. 142-RICO-01X3 under the EPA Response Action Contract No. 68-W6-0042 (RAC) to complete a Remedial Investigation/Feasibility Study (RI/FS) at the Hatheway & Patterson Superfund (Site) in Mansfield, Massachusetts. M&E assigned the primary responsibility for completing most of the Remedial Investigation to TRC Environmental Corporation of Lowell, Massachusetts (TRC). M&E is responsible for overall project management and completion of the Human Health Risk Assessment, subcontractor procurement, and some field staffing. Lockheed Martin Information Technologies, Environmental Services Assistance Team completed the Ecological Risk Assessment under a separate contract to EPA.

This Report presents a summary of the data collected during the Remedial Investigation. This report also includes the results of data that were collected in two investigations prior to inclusion of the site on the National Priorities List. One of these investigations was conducted by the Town of Mansfield under their Brownfields Demonstration Pilot Grant (Resource Controls, 2000), and the other investigation (Technical Assistance Effort) was conducted by EPA. All work, unless otherwise specified, was conducted in accordance with the EPA approved Site Management Plan, dated October 2002 the Field Sampling Plan Addendum, dated October 15, 2003, The EPA Ecological QAPP, dated October 2003 and the revised QAPP dated October 2003.

1.1 Purpose of Report

The following objectives for the Remedial Investigation Report evaluation were presented in the M&E/TRC Work Plan for this project. The location where each objective is addressed, either in this report or elsewhere, is noted in italics.

- Detailed presentation of Field Investigation Methods (drilling techniques, geophysical surveys, sampling and analysis) *Section 2*
- Description of Site Physical Characteristics (surface features, geology, soils and vadose zone, surface-water hydrology, hydrogeology, meteorology, human populations and land uses, and ecological investigations) *Section 3*
- Description of Existing and Potential Sources of Contamination *Section 5*
- Evaluation of Nature and Extent of Contamination in all pertinent media (soil, ground water in overburden and bedrock, sediment, and surface water) *Section 4*
- Description of additional Site Characterization Studies *Section 2*
- Presentation and Evaluation of Laboratory Analyses and Data Validation Protocol *Section 2*
- Data Analysis Site Characteristics (physical site characteristics, source area characteristics, nature and extent, and contaminant fate and transport) *Sections 3, 4 and 5*
- Summary of Human Health Risk and Ecological Risk Assessments *Section 6*
- Overview of Data Management Procedures *Section 2*

1.2 Background

1.2.1 Site Location

Figure 1.2-1 shows the location of the Site in the town of Mansfield, Massachusetts approximately 30 miles southwest of the City of Boston, Massachusetts at 42° 2' 14.8" north latitude and 71° 13' 19.0" west longitude.

The Hatheway and Patterson Superfund Site is located on 35 County Street in Mansfield, Bristol County, Massachusetts. Approximately 36 acres of the 38.17-acre site are located in the Town of Mansfield. The remaining 1.77 acres are located in the Town of Foxborough. The site is a former wood preserving facility owned and operated by the Hatheway and Patterson Company. Operations ceased in 1993, when the company declared bankruptcy. The Town of Mansfield currently owns the majority of the Site. The portion located in Foxborough is still owned by Hatheway and Patterson.

1.2.2 Site Description

Figure 1.2-2 shows the layout of the Site. The Site is bordered to the north by County Street and residential properties, to the south and west by residential areas, and to the east by commercial and industrial properties. The property is bisected by the Rumford River, which runs north to south, and by a railway right-of-way, which runs east and west. The majority of the site is zoned for industrial mixed use (I-3). The parcel located in Foxborough is in a Residential and Agricultural District (R-40). Parcels surrounding the site include both businesses and residential properties. The railroad tracks and the Rumford River divide the site into four quadrants (NE, NW, SE, SW) as shown on Figure 1.2-2.

The majority of the historical operational areas and buildings are located on the northern portion of the property, north of the railroad tracks. This "Operations Area" contains process buildings, three drip pads, support buildings, an office, and a laboratory.

Areas of the Site that are south of the railroad tracks are generally level as a result of filling activities, and were used for storing treated wood. Wood Storage Area 1 is located north of the railroad adjacent to the Operations area, Wood Storage Areas 2 and 3 are located on the southern side of the railroad tracks. Two former wood storage buildings were located in the southeastern portion of the property. Two small hills (approximately 15 and 50 feet high) are located on the southeastern portion of the property and a bedrock outcrop (approximately 20 feet high) is also present in this portion of the property. An abrupt topographic drop of approximately 10 to 20 feet extends in an east-west orientation, along the southern edge of the fill line. The area south of the fill line is topographically lower, densely wooded, contains wetlands and is bounded by the Rumford River backwash channel. The Rumford River Backwash Channel was created after re-routing of the Rumford River between 1951 and 1956.

1.2.3 Zoning

In the Town of Mansfield, the site is comprised of eight parcels as documented in the Town's Tax Assessor records, and includes Lots 230, 231, 232/233, 234, and 235 on Assessors Map 18 and Lots 210 and 220 on Assessors Map 19. These parcels, comprising 36.4 acres, are currently owned by the Town of Mansfield. A portion of the Site, comprising one 1.77-acre parcel is located in the Town of Foxborough. Hatheway and Patterson is the owner of this parcel according to Tax Assessor records. The railroad right-of-way that bisects the site is owned by CSX Corporation.

The parcels located in Mansfield are in an I-3 zone. This is a flexible mixed use industrial zone, which allows an array of uses from heavy manufacturing to multi-family dwellings to daycare centers. The following uses are not allowed in the I-3 zone: residential compound, assisted care retirement facility, residential facilities for residents 55 or older, community life care center, aviation, mall, fast food restaurant, car wash, motor vehicle salvage, and adult establishments.

The parcel located in Foxborough is in a Residential and Agricultural District (R-40). This district is established to promote agricultural uses and low-density residential uses and to allow other selected uses, which are compatible with the open and rural character of the district.

The site is located in an area heavily populated by both businesses and residential properties, with the closest residence located across County Street and approximately 50 feet north of the site. Immediately north and west of the site and to the southeast are domestic dwellings.

As part of the Superfund Redevelopment Initiative, EPA developed a program to help local governments participate in the cleanup and reuse of Superfund Sites. Under this program, grants of up to $100,000 and/or other support services are provided to local governments to help determine the future use of Superfund sites in their communities. EPA Region 1 awarded one of these Superfund Redevelopments Grant to the Town of Mansfield to assist in planning for the reuse of the site. A Superfund Reuse Assessment was completed by TRC (TRC, 2003) and a report from the Town's consultant is in preparation at the time of this writing. A Reuse Assessment involves collecting and evaluating information about the current and reasonably anticipated future uses of a Superfund Site. This information is necessary to design and design a cleanup remedy that will be protective of those uses. The reuse assessment can also avoid unnecessary barriers to site reuse by enabling future uses to be considered in the cleanup process.

1.2.4 Operational History

Initially, the Hatheway & Patterson property consisted of only the land between County Street and the railroad tracks, and the land from the present eastern property boundary to approximately the Rumford River (Figure 1.2-2). The land west of the Rumford River was owned by the Penn Central Railroad, who used it for bulk chemical transfer and storage of electric/utility poles and railroad ties. This piece of land was purchased by Hatheway & Patterson in 1978. The land south of the railroad tracks was purchased by Hatheway & Patterson in 1981. This portion of land was apparently not used between 1955 and 1971, but prior to 1955 the area was reportedly used for coal storage.

Operations at the site included the preservation of wood sheeting, planking, timber, piling, poles and other wood products. Reports indicate that Hatheway & Patterson began operations at the Site in 1927, but that wood treating did not begin until 1953. It is unknown what operations might have been conducted on site between 1927 and 1953.

Wood treatment was accomplished by a variety of methods that changed over time. From 1953 through 1958, a solution of pentachlorophenol (PCP) in fuel oil, or creosote, was used for dipping lumber. After dipping, excess chemicals were allowed to drip off of the treated wood onto the ground surface. From 1958 through 1974, solutions of PCP in fuel oil and fluoro-chrome-arsenate-phenol (FCAP) salts in water were both used in a pressure treatment process. From 1960 through 1984, PCP in mineral spirits was also used to pressure-treat lumber. From 1974 to 1984, operations incorporated PCP in fuel oil and chromated copper-arsenate (CCA) salts in water. From 1984 until operations ceased in 1993, solutions of CCA salts in water and PCP in water were utilized at the property. Wood was also infused with fire retardants including Dricon™ (boric acid and anhydrous sodium tetraborate). The various wood-treating chemicals were stored in aboveground storage tanks (ASTs), underground storage tanks (USTs), and sumps located inside and outside of the former process buildings (MADEP, 1994).

1.2.5 Previous Investigations

In 1972, a tar seep (approximately 62 feet long and 6 inches thick) was discovered on the banks of the Rumford River on the southern portion of the property (exact location unknown) by representatives of the Town of Mansfield and the Massachusetts Department of Environmental Quality Engineering (MADEQE). Additionally, "oily water" and dead fowl were reported in Fulton Pond (the Rumford River discharges into and exits Fulton Pond downstream of the property). Subsequently, MADEQE and the Town of Mansfield requested Hatheway & Patterson to contain the "oily seepage", which appeared to originate from the eastern bank of the Rumford River adjacent to the Hatheway & Patterson Company (HPC) property (DynCorp, 2001).

Hatheway & Patterson took steps to control the "oily seepage" with deep water booms and sorbents. In 1973, test wells, as well as a collection pit and a collection trench, were installed to pump oil-contaminated ground water. By the summer of 1973, oil seepage reportedly ceased; however, later in the year, seepage appeared farther downstream. As a result, Hatheway & Patterson installed a treated plywood bulkhead to trap the seepage and continued removing oil with sorbents. In 1974, an "L-shaped non-permeable" barrier was installed with four recovery pits along the river. Ground water pumping operations were conducted from approximately 1973 through 1982 (DynCorp, 2001).

In 1981, an "oily seepage" was again observed in the Rumford River. A prospective buyer of the property conducted soil and ground water sampling on the property. Analyses of the samples revealed "oily soils and/or oily ground water." As of 1982, approximately 2,500 gallons of oil had been recovered through the ground water pumping operations (DynCorp, 2001).

In May 1987, following an on-site reconnaissance, MADEQE issued a Notice of Noncompliance (NON) letter to Hatheway & Patterson. The NON required Hatheway & Patterson to complete a

Phase I Initial Site Investigation (Phase I) pursuant to Massachusetts General Law (MGL), Chapter 21 E, Sections 4 and 5 (DynCorp, 2001).

In November 1987, Keystone Environmental Resources, Inc. (Keystone) of Monroeville, Pennsylvania conducted a Soils and Hydrogeologic Investigation (i.e., a Phase I) of the property. The investigation consisted of advancing 11 soil borings (B-001-88 through B-011-88) on the property, and an additional nine soil borings, which were completed as monitoring wells (MW-001 through MW-004, MW-005A, MW-005B, MW-006, MW-007A, and MW-007B) (DynCorp, 2001).

Keystone collected 18 soil samples from various depth intervals. All of the soil samples were analyzed for phenols by EPA SW-846 Method 8040; polynuclear aromatic hydrocarbons (PAHs) by EPA SW-846 Method 8310; chromium and copper by EPA SW-846 Method 6010; and arsenic by EPA SW-846 Method 7060. In addition, samples collected from the borings that were completed as monitoring wells [MW-003 (6 to 8 ft); MW-004 (8 to 10 ft); MW-005B (6 to 8 ft); MW-006 (4 to 8 ft); and MW-007B (8 to 10 ft)] were analyzed for aromatic volatile organic compounds (VOCs) by EPA SW-846 Method 8020. Three VOCs, 16 PAHs, 12 phenolic compounds, and the three metals were detected in the soil samples (DynCorp, 2001).

Two rounds of ground water sampling (January and March 1988) were also completed as part of the Phase I. Ground water samples were collected from all the monitoring wells (MW-001 through MW-004, MW-005A, MW-005B, MW-006, MW-007A, and MW-007B) on the property. Three surface water samples were also collected from the Rumford River during the March 1988 ground water sampling event at locations ABOVE-PLANT, MID-PLANT, and BELOW-PLANT. The surface water and ground water samples were submitted for analysis for aromatic VOCs by EPA Method 602; phenols by EPA Method 604; PAHs by EPA Method 610; chromium and copper by EPA Method 200.7; and arsenic by EPA Method 206.2 (DynCorp, 2001).

Laboratory analysis of the ground water samples revealed the presence of 17 PAHs and 12 phenolic compounds. VOCs including xylenes, 1,4-dichlorobenzene, and ethyl benzene, and metals including arsenic, chromium, and copper were also detected in the ground water samples. Benzene and phenol were detected in surface water samples collected above-plant and below-plant, respectively (DynCorp, 2001).

As a result of ground water pumping in the mid-1970s, several drums of recovered oil were stored on the property along the east bank of the Rumford River, approximately 175 ft south of the railroad tracks. According to Keystone, at an unknown date, vandals reportedly shot holes in the drums, tipped the drums over, and allowed the oils to seep into the ground and the river (DynCorp, 2001).

After review of the Phase I report, MADEQE issued a Notice of Responsibility (NOR) letter to Hatheway & Patterson in August 1988. The NOR required Hatheway & Patterson to complete a Phase II Site Investigation (Phase II), a Risk Assessment, and an alternative evaluation (DynCorp, 2001).

In late 1988 and early 1989, on behalf of Hatheway & Patterson, Keystone performed a Phase II investigation of the property. The investigation consisted of advancing an additional six soil borings (B-012-89 through B-017-89), installing an additional seven monitoring wells (MW-008A, MW-008B, MW-009A, MW-009B, and MW-010 through MW-012), and installing two piezometers (P-1 and P-2, not found during RI investigations) and one pump test well (PW-001) (DynCorp, 2001).

A total of 14 soil samples were collected from various depth intervals during soil boring advancement, and monitoring well, piezometer, and pump test well installation. Three ground water sampling rounds were conducted in February, March, and April 1989 as part of the Phase II. In addition, Keystone collected three surface water samples, and nine sediment samples from areas north and south of the Rumford River backwash channel (DynCorp, 2001).

Soil, ground water, surface water, and sediment samples were submitted for analysis for aromatic VOCs by EPA SW-846 Method 8020, phenols by EPA SW-846 Method 8040, and PAHs by EPA SW-846 Method 8310. In addition, soil samples were analyzed for total chromium and copper by EPA SW-846 Method 6010 and total arsenic by EPA SW-846 Method 7060. Ground water samples were also analyzed for total and soluble chromium and copper by EPA Method 200.7 and for total and soluble arsenic by EPA Method 206.2 (DynCorp, 2001).

Laboratory analysis of the soil and ground water samples revealed the presence of VOCs, phenolic compounds, PAHs, chromium, copper, and arsenic. Phenolic compounds and PAHs were also detected in surface water and sediment samples. The only VOC detected in the sediment samples was toluene, which was present in all the sediment samples. No VOCs were detected in the surface water samples (DynCorp, 2001).

In June 1990, after a period of heavy rainfall, "oily seepage" was again reported on the Rumford River in the vicinity of the HPC property. As a result, the Massachusetts Department of Environmental Protection (MADEP), formerly MADEQE, issued a Request for Short Term Measure (STM) letter to Hatheway & Patterson to address the imminent hazard to the Rumford River area caused by on-site operations (DynCorp, 2001).

In the fall of 1990, Keystone conducted a STM investigation. The investigation included the "sampling of the worst-case visibly stained soil along the river bank". Keystone reported that the results of the analyses indicated that the major constituent of the seepage to the river were semivolatile organic compounds (SVOCs) (DynCorp, 2001).

Also as part of the STM investigation, Keystone advanced soil borings (B-18 through B-23), with three of the soil borings (B-20, B-18, and B-23) completed as piezometers (P-3 through P-5) along the eastern bank of the river. Headspace readings of soil samples ranged from 0 to 55 units above background levels. Oil and odors were also reported in some of the soil samples (DynCorp, 2001).

In September 1991, in response to MADEP's request for a STM, Hatheway & Patterson constructed a collection trench along the eastern bank of the Rumford River. Contaminated ground water recovered from this trench was used by HPC as process make-up water. The collection trench was designed to intercept ground water and oils migrating to the river from the oil-contaminated portion of the river bank. Some soil was excavated during the STM and stockpiled on site (DynCorp, 2001).

In February 1992, Penney Engineering, Inc. (Penney) of Mansfield, Massachusetts began monthly monitoring of the collection trench. Penney retrofitted the trench to include a ground water treatment system consisting of activated carbon canisters prior to discharging the ground water to the Rumford River; this discharge was excluded from National Pollutant Discharge Elimination System (NPDES) requirements for a 6-month period (DynCorp, 2001).

In March 1992, two RCRA inspections were conducted at the property to determine compliance with RCRA drip pad standards. The inspections revealed that drip pads were riddled with cracks, seams, gaps, and corroded areas in the concrete, and portions of the drip pads were not curbed or bermed. The inspection concluded that these drip pads were not in compliance with RCRA regulations (DynCorp, 2001).

In January 1993, MADEP conducted an inspection of the property, and reported observing petroleum product flowing from the river bed into the river, a release of oil into nearby wetlands, and free-floating product in the wetlands. As a result, MADEP requested HPC to conduct an additional assessment and develop plans for corrective action at the property (DynCorp, 2001).

In February 1993, Hatheway & Patterson filed for bankruptcy protection. In April 1993, manufacturing operations ceased at the property; and the HPC facility closed on May 21, 1993, leaving wood-treatment chemicals and sludge in ASTs, UST sumps and drums at the property (DynCorp, 2001).

On June 22, 1993, EPA Region I Emergency Planning and Response Branch (EPRB), MADEP, and Weston personnel initiated a Preliminary Assessment/Site Investigation (PA/SI) at the HPC property. A high priority for a PA/SI was warranted based on the facility closing and the presence of wood-treatment chemicals at the abandoned property (DynCorp, 2001).

Weston personnel reported that 20 55-gallon drums and eight ASTs (volumes unknown), located in various process buildings, containing a total of approximately 45,000 gallons of wood-treating chemicals (with varying percentages of PCP, CCA, and Dricon™), as well as one AST (volume unknown) containing fuel oil, were located on site. Most of the indoor sumps and pits contained water and sludge from the former wood-treatment processes. Six USTs containing various process wastes were located in the vicinity of the former Cylinder No. 01 and 02 Building. A pile of contaminated soil that had been excavated during implementation of the STM was observed near the south-central portion of the property. In addition, Weston personnel observed an area of stained soil and stressed vegetation associated with "oily seeps" located along the southern edge of the fill line (DynCorp, 2001).

Weston personnel collected six soil samples from the property. Sample locations included the "oily seeps," the contaminated soil pile, stained soils adjacent to and south of the railroad right-of-way, and soils from the wood storage area west of the CCA drip pad. The samples were analyzed for SVOCs by EPA SW-846 Method 8270 and total metals by EPA SW-846 Methods

6010/7000. Laboratory analyses of the soil samples revealed the presence of 16 SVOCs and seven metals (DynCorp, 2001).

On July 15, 1993, the ground water treatment system operations were terminated. At that time, it was concluded by MADEP that the ground water, surface water, and river sediments were contaminated with PCP. MADEP also determined that a PCP- and CCA-contaminated ground water plume was moving south into the adjacent wetlands and the Rumford River backwash channel. In addition, non-aqueous phase liquid (NAPL) was observed in monitoring wells that had previously been free of NAPL (DynCorp, 2001).

On December 7, 1993, based on the results of the PA/SI, EPA Region I EPRB initiated an Emergency Removal Action (ERA) due to the presence of ASTs and USTs containing hazardous wastes located inside and outside the buildings, and the possibility of a release if the tanks and/or pipelines froze and ruptured during cold weather (DynCorp, 2001).

Activities conducted during the ERA included the characterization of chemical wastes (Dricon™, CCA, and PCP) stored in the ASTs, USTs, vessels, and drums on the property. A total of 32 ASTs and USTs were identified on the property. Sludge samples collected from the ASTs and USTs revealed the presence of six VOCs, five SVOCs, 11 metals, dioxin/furan congeners, pesticides and polychlorinated biphenyls (PCBs). All virgin wood-treating solutions were shipped to other wood-treating facilities. Approximately 100,000 gallons of liquid and solid wood-treating wastes were drummed and/or pumped into tank trucks and shipped to appropriate hazardous waste disposal facilities (DynCorp, 2001).

On December 12, 1993, the HPC property was added to the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database (DynCorp, 2001).

In September 1994, a comprehensive surface soil investigation was initiated as part of the ERA. Approximately 75 surficial soil samples were collected by Weston Response Engineering and Analytical Contract (REAC) personnel from various areas on the property and screened on site for PCP, PAHs, chromium, copper, and lead. In addition, approximately 100 soil samples were collected from the property and screened on site for arsenic. The maximum concentration of arsenic detected was at 3,000 parts per million (ppm) (DynCorp, 2001).

In December 1994, MADEP prepared a PA report for the HPC property. MADEP reported that as of November 1994, all containerized waste, including liquid wastes and sludge in small non-drum containers, drums, and tanks, had either been removed from the property or drummed and staged in an on-site building. The staged drums were awaiting acceptance into approved facilities at the time of the PA. The drums were eventually removed as part of the ERA. The PA report also summarized previous investigations that had been conducted on the property(DynCorp, 2001).

From April to June 1995, the comprehensive surface soil investigation continued as part of the ERA. Soil samples were collected from a variety of areas on the property and screened on site for arsenic. In addition, approximately 80 soil samples were collected from the southern portion of the property and were analyzed for arsenic at the EPA New England Regional Laboratory. The maximum concentration of arsenic detected was 460 ppm. Based on the elevated concentrations of arsenic detected, several areas of the property received temporary geotextile/gravel and/or asphalt cover (DynCorp, 2001).

Additional operations conducted as part of the ERA included repair and installation of fencing around the perimeter of the property, installation of locks to manways of tanks, and installation of locks to on-site buildings. ERA operations continued until September 1995. Following the ERA, MADEP-Southeast Region assumed oversight of the property (DynCorp, 2001).

On April 10, 1998, START personnel conducted an on-site reconnaissance of the HPC property.

START personnel observed several ASTs and USTs located throughout the former operations area. Several ASTs could not be observed by START personnel as they were located in buildings that were locked. The hatches to all the USTs were chained and locked (DynCorp, 2001).

START personnel observed the former CCA drip pad (approximately 120 ft by 45 ft and constructed of concrete) located along the northeast property boundary. Portions of the drip pad were stained green, similar to copper salts. START personnel also observed the former PCP drip pad (approximately 110 ft by 45 ft and constructed of concrete) (DynCorp, 2001).

Upon disturbing sediments adjacent to the concrete retaining wall and former ground water treatment system area, START personnel observed oily sheens breaking out into the Rumford River. Oily seep outbreaks were also observed on soil in the south-central portion of the property along the southern edge of the fill line. The seeps emitted an oily odor. Air monitoring with a photoionization detector (PID) was conducted near the oily seeps. The reading on the PID was recorded as 4 units above the background level (DynCorp, 2001).

START personnel observed a pile of soil located south-southeast of the former ground water treatment system area, which was covered with deteriorated plastic sheeting. This pile of soil is likely the pile of contaminated soil that had been excavated from the eastern bank of the Rumford River during construction of the collection trench, and later sampled by Weston personnel in June 1993 (DynCorp, 2001).

Air monitoring with a PID was conducted on the headspace on several previously installed monitoring wells. The PID recorded 8 and 6 units above background in MW-001 and MW-012, respectively. In addition, one apparent background monitoring well (MW-011) was observed north (upgradient) of the property along King Street. No readings were observed above ambient background levels in the breathing zone during the on-site reconnaissance (DynCorp, 2001).

On June 11, 1998, MADEP-SE personnel collected six samples from the property. Sample matrices and locations included the following: ground water from MW-005A; oil from MW-012; surface water from the Rumford River downstream of the property; sediment from the Rumford River adjacent to the concrete retaining wall; soil/sediment from an oily seep outbreak area along the southern fill line; and surficial soil adjacent to MW-009A and MW-009B

(SOIL_NEAR_MW-9). Samples were analyzed for dioxin/furan congeners by EPA Method 1613A. Analytical data from these samples indicated elevated of dioxins and furans in sediment (DynCorp, 2001).

On October 16, 1998, EPA Region I Removal Branch personnel collected 12 sediment samples (RRUS-S, RRUS-2S, RRHP01, RRHP02, RRHP03-S, RRHPSB, RRFP, FPE, FPW, FPS, FPFP, RRKP-S) and five surface water samples (RRKP-W, FP, RRUS-W, RRUS-2W, RRHP03-W) from the Rumford River at locations upstream, adjacent, and downstream, including Fulton Pond and Kingman Pond, of the property. The samples were collected to determine if there had been any migration of hazardous substances from the property to surface water. In addition, EPA Region I Removal Branch personnel collected six surficial soil samples (SSHP01 through SSHP06) from the property (DynCorp, 2001).

One SVOC, 16 dioxin/furan congeners, and two metals were detected in sediment samples; five dioxin/furan congeners were detected in surface water samples; and five SVOCs, 16 dioxin/furan congeners, and five metals were detected in soil samples (DynCorp, 2001).

On November 23 1998, EPA Region I Removal Branch personnel collected seven fish tissue samples from the Rumford River (downstream of the HPC property) to determine the potential for bioaccumulation of PCP, dioxin/furan congeners, and arsenic in fish tissue. PCP and a total of seven dioxin/furan congeners were detected in the fish tissue samples. Arsenic was not detected in any of the fish tissue samples (DynCorp, 2001).

In 2000, the Town of Mansfield conducted an environmental investigation at the site (performed by Resource Controls) under the Town of Mansfield's EPA Brownfields Pilot Program. The study included installation of nine overburden ground water monitoring wells, two bedrock ground water monitoring wells, sampling of surface water, sediment, soil and ground water. Findings confirmed earlier studies indicating dioxin, arsenic and PCP contamination in surface soil, LNAPL south of the railroad tracks, ground water contamination including arsenic and PCP, and sediment contamination. The report indicated the possible presence of Dense Non Aqueous Phase Liquid (DNAPL) in well BR-2, but no data were obtained to confirm this observation (DynCorp, 2001).

In fall 2001, M&E and TRC initiated a sampling effort including sampling of 15 existing ground water wells, and surface water/sediment from 19 locations in the Rumford River (multiple sediment samples were obtained from some locations, and surface samples were not collected at each station) and two vernal pools. The investigation was conducted in accordance with the Field Sampling Plan and Quality Assurance Project Plan (M&E, September 2001). The results indicated the presence of a ground water plume containing arsenic and PCP extending from the Operations Area to the Rumford River, and a possible second ground water plume emanating from the southern portion of the site. Elevated concentrations of arsenic, lead, PCP and dioxin detected in sediment adjacent to the site and elevated concentrations of PCP were detected in surface water at the site (DynCorp, 2001). It should be noted that the substrate in the vernal pools at the site can be considered "sediment" for only several weeks in early spring when the pools are filled with water. For the remainder of the year, the vernal pools are dry and their substrate should more accurately be considered as "soil". However, in the discussions that follow, the vernal pool substrate is only referred to and discussed as "sediment."

In April 2003, the EPA laboratory obtained several surface soil samples outside of the perimeter fence to determine whether there was any off-site arsenic contamination. Samples were obtained on both sides of County Street and were analyzed for arsenic. Some samples contained arsenic in excess of 30 ppm (DynCorp, 2001).

In August 2003, the EPA Removal Branch initiated an Emergency Removal Action to address the off-site arsenic-contaminated soil identified in the April 2003 investigation. A total of 376 tons of soil was removed from both sides of Country Street. The excavations were lined with geotextile and backfilled with clean soil (Weston, 2004).

1.3 Organization of Report

The organization of this report essentially follows the outlined that is suggested in the United States Environmental protection Agency's "Guidance or Conducting Remedial Investigation and Feasibility Studies under CERCLA (EPA, 1988). The first two sections present background information about the study area and describe the investigations that were conducted. Section 3.0 presents the physical characteristics of the study area. Section 4.0 discusses the nature and extent of contamination of the site and study area. Section 5.0 presents a discussion of the fate and transport of site contamination, including potential migration pathways. Section 6.0 presents a summary of the human health and ecological risk assessments.

2.0 Study Area Investigation

This section describes site investigation activities that occurred at the Site during the Remedial Investigation.

2.1 Areas of Concern

Figure 2.1-1 shows the location of the six areas of concern that were studied.

1. Operations Area
2. Light Non-Aqueous Phase Liquid (LNAPL) Area
3. Wood Storage Area 1
4. Wood Storage Area 2
5. Wood Storage Area 3
6. Rumford River
7. Off-site Areas

There are no private drinking water wells in the area, therefore, no residential well sampling was performed. There are 3 private wells on Highland Avenue (125 Highland, 132 Highland and 136 Highland) that are used for non-potable purposes.

Two phases of investigation were conducted at the site.

- **Remedial Investigation Phase I:** This phase, described in the Site Management Plan (M&E, October 2002), included collection of soil, ground water, surface water and sediment samples.

- **Remedial Investigation Phase II:** Based on the findings of Remedial Investigation Phase I, a second phase was conducted in accordance with a revised Quality Assurance Project Plan (M&E, October 2003) to delineate findings of the first phase including, advancement of soil borings, installation of bedrock and overburden ground water monitoring wells, sampling and laboratory testing of, ground water, surface water, biota and sediment, ecological survey activities and geophysical surveys.

In addition, separate sampling activities took place in areas remote from the site for the purposes of evaluating background and "reference" conditions.

Unless otherwise noted in this report, the Remedial Investigation methods and techniques, including the collection and analysis of samples and quality assurance and quality control procedures, were all in accordance with the recommendations and guidelines of the United States Environmental Protection Agency and the Massachusetts Department of Environmental Protection, as well as the various protocols submitted for lead regulatory agency approval, prior to and during the investigation.

2.2 Mobilization

TRC completed several activities in preparation for site sampling including the following.

- Subcontractor pre-bid meetings
- Field office setup and utility connections
- Site reconnaissance for existing monitoring wells, outfalls, and other significant features
- Town/state file reviews of background information
- Clearing and grubbing of work areas
- Mobilization of field equipment
- Staking of sampling reference grid

At the conclusion of field activities, all equipment was removed from the site.

2.3 Ecological Surveys

M&E undertook a reconnaissance level habitat evaluation to help build the foundation of a future ecological risk assessment. The first stage included review of existing terrestrial or aquatic studies that have been conducted at the Hatheway & Patterson site or within the watershed. EPA provided M&E with aerial site photos for review. M&E also contacted the United States Fish and Wildlife Service (USFWS) and the Massachusetts Natural Heritage and Endangered Species Program (MANHESP) to determine whether any federal or state threatened, endangered, or special concern species or critical habitats are known to exist in the vicinity of the project site. The MANHESP atlas was also reviewed to determine the presence of any estimated habitat, priority habitat, or certified vernal pools in the vicinity of the project site. The literature review also included a review of United States Geological Survey (USGS) maps and Natural Resources Conservation Services (NRCS) Soil Survey for the site.

On September 19 and 20, 2001, M&E biologists visited the site to conduct a reconnaissance level ecological survey. The field survey included a qualitative review of the site to identify upland and wetland habitats. Wetland and upland habitats were qualitatively characterized in terms of their dominant plant species, vegetative strata, presence of invasive species, and presence of human disturbance/alteration. Wetland areas were identified employing a three parameter method (hydrophytic vegetation, hydrology, and hydric soils) as described in the U.S. Army Corps of Engineering 1987 manual. During the field visits, mammals, birds, herpetiles and benthic organisms observed by sight or sign were recorded. Benthic organisms were collected during dip-net sweeps in the river and identified in the field to the lowest possible taxon (usually order or family). Benthic substrate type and water depth were also noted. Note that wetlands and uplands were not formally delineated, and vegetation dominance values are only rough estimates.

In September 2001, M&E conducted a vernal pool survey at the Site. Eight vernal pools were identified. On April 25, 2002 surface water and sediment samples VP-001 and VP-002 were collected from vernal pools VP-D1 and VP-C2, respectively. At the time of sampling vernal pool VPC2 measured 6 feet long by 2.4 feet wide by 0.5 feet deep, and VPD1 measured 28 feet long by 16 feet wide by 0.8 feet deep. Surface water samples were analyzed for metals, SVOCs, and total mercury. Sediment samples were analyzed for metals, SVOCs, and TOC/TCO/Grain Size.

Scientists from Metcalf & Eddy, Inc. visited the Hatheway Patterson Superfund site in November 2004 to delineate the wetlands within the property boundary. The delineation was conducted in accordance with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) for administering MGL Chapter 31, Section 40; "Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act"; and the Town of Mansfield Wetland Protection Bylaw. The delineation identified the limits of inland bank, including the Rumford River, as well as bordering vegetated wetlands.

2.4 Geophysical Survey

Appendix PP presents the results of a ground pentrating radar survey that was performed at the site to examine subsurface utilities related to on-site catch basins and manholes. The ground penetrating radar survey was conducted in November 2003 by Hager GeoScience, Inc (HGI).

HGI performed the survey on November 24 and 25, 2003 using a GSSI SIR GPR system with a 500 MHz antenna and survey wheel. Results were recorded real time on the unit's hard drive and transferred to a PC for analysis using RADAN for Microsoft Windows NT software. In the grid survey areas, GPR data were collected along transverses spaced 5 feet apart in two perpendicular directions. In the non-grid survey areas, GRP data were collected along transverses, spaced 5 to 10 feet apart, perpendicular to the drain line or utility being traced.

At several of the catch basin and manhole locations, HGI personnel laid out grids using measuring tapes and spray paint. At other locations, HGI traced pipes without extensive grids and marked the drain lines and other utilities on the ground with spray paint.

2.5 Cone Penetrometer Survey

Figure 2.5-1 shows the location of the cone penetrometer (CPT) survey points that were advanced at the site. Appendix QQ presents the CPT report. Table 2.5-1 lists the details pertaining to each survey point, including whether or not video was logged at each location. The CPT survey was conducted in November 2002 to assess the extent of residual LNAPL contamination in the south and southeast portions of the Site. Applied Research Associates, Inc. (ARA) of South Royalton, Vermont was contracted to conduct the CPT survey.

LNAPL impacts were measured using a Fuel Fluorescence Detector (FFD). The FFD detects the fluorescence produced by hydrocarbons when illuminated by an ultraviolet light source. The FFD probe system analyzes lighter petroleum hydrocarbons (gasoline, jet fuel, kerosene) in the LFFD channel and heavier petroleum hydrocarbons (coal tar, No. 4 heating oil, creosote) in the HFFD channel. The fluorescence of the hydrocarbons is measured in millivolts (mV). In general, FFD response is quantified as follows:

- 10 mV – minimal impacts
- 20 mV – low impacts
- 50 mV – moderate impacts
- 80 mV and greater – highly impacted

To further assess the subsurface conditions associated with the residual LNAPL, ARA conducted down-hole video (Video-CPT) at select sample sites to accompany and confirm the presence of the LNAPL implicated by the FFD readings.

2.6 Soil Sampling

Table 2.6-1 presents a summary of surface and subsurface soil samples that were collected during the RI. Surface and subsurface samples collected during the RI were analyzed for SVOCs, metals, dioxins/furans, TOC/TCO, and grain size.

Screening was conducted on select surface and subsurface soil for select metals and PCP to select which samples would be sent to the laboratory. Metals screening samples were analyzed for arsenic, lead, copper, and chromium by TRC field staff using a Niton™ X-Ray Fluorescence (XRF) analyzer (XL-7025 series). PCP screening samples were analyzed using the Strategic RAPID Assay® immunoassay screening kit for PCP.

2.6.1 Surface Soil

Figure 2.6-1 shows on-site surface soil sampling locations, and Figure 2.6-2 shows off-site surface soil sample locations. Four groups of surface soil were collected.

- Group 1 included surface soil samples SS-001 through SS-020. Each of these samples was analyzed for dioxin/furans. Three of these samples (SS-015, SS-016, and SS-018) were analyzed for SVOCs.

- Group 2 included SS-021 through SS-025 located in and around the Operations Area. Samples were screened for PCP and submitted for laboratory analysis of SVOCs.

- Group 3 included surface soil samples from the Operations Area and along County Street (SS-026 through SS-045). The majority of these samples were screened for arsenic, lead, chromium and copper using XRF. Based on the results of the screening, several samples were submitted for laboratory analysis of SVOCs and metals. Some samples also submitted for dioxins/furans.

- Group 4 consists of surface soil samples from off-site "background" locations (SS-046-SS-057). These samples were screened for arsenic, lead, copper and chromium using XRF. Based on the results of the screening, selected samples were submitted for laboratory analysis of SVOCs and metals. Background surface soil sample locations are shown in Figure 2.7-2.

Surface soil sample locations (SS-023, SS-027 through SS-029, and SS-032) were subsequently removed during the 2003 EPA Removal Action.

2.6.2 Subsurface Soil

Figure 2.6-3 shows all existing subsurface soil sample locations. TRC advanced 12 small diameter borings using direct-push methods to approximately 10 feet (SB-001 through SB-012).

Two composite soil samples were collected from each boring (1-4 feet and 4-10 feet). Samples were screened for arsenic, lead, chromium and copper using XRF and for PCP using the immunoassay test kit method. Selected samples were submitted for laboratory analysis of SVOCs, metals, dioxins/furans, TOC/TCO, and grain size. As part of the metals XRF screening process, samples were dried, sieved, and homogenized in the field prior to the XRF analysis. A portion of the dried, sieved, and homogenized aliquot was sent to the laboratory for the confirmatory metals analysis. Due to the potential for volatilization for mercury during this drying procedure, a separate aliquot of sample that had not been dried, sieved or homogenized was also sent to the laboratory for metals analysis on order to obtain an accurate result for mercury. Both the dried and undried samples were analyzed for the full list of metals. Table 2.6-1 shows the different sample identifications used for the dried and undried aliquots of each sample

2.7 Ground Water Investigation

2.7.1 Monitoring Well and Piezometer Installation

Seven shallow piezometers (PZ-001, PZ-002, and PZ-004 through PZ-008) and six bedrock monitoring wells (MW-101R, MW-103R, MW-105R, MW-107R, MW-109R and MW-111R) were installed during the RI. Each piezometer and well was completed with a ten-foot screen. Appendix A presents the boring and monitoring well construction logs for pre-existing and newly installed monitoring wells.

2.7.2 Ground Water Sampling

Figure 2.7-1 shows the locations of the ground water monitoring wells that were sampled as part of the RI. Table 2.7-1 shows the well construction details, Table 2.7-2 summarizes the laboratory tests that were performed. Ground water samples were collected, handled, and analyzed in accordance with the EPA-approved FSP/QAPPs.

Existing wells were examined to evaluate whether they were suitable for sampling. New and select existing wells were developed using a portable submersible pump. TRC recorded the static water level, depth of well, and the pumping rate for each well. Wells were pumped until the water ran clear. Water quality field parameters (temperature, DO, turbidity, pH, ORP and specific conductivity) were also recorded periodically during well development. In wells where LNAPL was present in the well, it was removed from the well prior to development. Purge water and LNAPL were contained on-site in drums.

Prior to sampling, each well was checked for the presence of LNAPL with an oil/water interface probe. If LNAPL was present, the thickness was measured and recorded, a sample obtained using a bailer, then the LNAPL was removed using a bailer. Next, the oil/water interface probe was lowered to the bottom of the well to check for dense non-aqueous phase liquid (DNAPL). No DNAPL was noted during any well sampling. Next, a ground water sample was obtained from the well using a pump and EPA low flow techniques. Water quality parameters (temperature, pH, specific conductivity, DO, turbidity, and ORP) at the time of the sampling were measured in the field using field instrumentation.

Three rounds of ground water sampling were conducted. In December 2002, sampling of the seven newly installed piezometers was performed. Samples were analyzed for SVOCs and metals. One round of ground water sampling was conducted in December 2003 on 32 monitoring wells. Samples from these wells were analyzed for SVOCs and metals. Two ground water monitoring wells (MW-101R and PW-001) were sampled separately on April 15 and 16, 2004.

2.8 Rumford River

Figure 2.8-1 shows the on-site surface water and sediment sample locations, and Figure 2.8-2 shows the off-site surface water and sediment locations. Surface water and sediment samples were collected from the Rumford River at locations upstream, downstream, and within the Site to supplement existing surface water and sediment sample results obtained in previous investigations.

2.8.1 Surface Water Investigation

Table 2.8-1 presents a summary of surface water samples. Surface water samples from the Rumford River were obtained in accordance with the EPA-approved FSP/QAPP. TRC collected samples concurrent with the sediment sampling activity, proceeding upstream from the furthest downstream location. The standing water depth at each location was at least eight inches, and samples were obtained in areas where the flow of surface water was preferentially lower.

Surface water samples were collected at two locations, SW-015 and SW-016, in the Rumford River. Samples were analyzed for SVOCs, low level PAHs, and total and dissolved metals. Multiple samples were collected from each location to evaluate contaminant concentrations and surface water toxicity.

2.8.2 Sediment Investigation

Sediment samples from the Rumford River and associated tributaries were obtained in accordance with the EPA-approved FSP/QAPP. TRC collected the sediment samples concurrent with the surface water sampling activity, proceeding upstream from the furthest downstream location. Table 2.8-2 presents a summary of sediment samples.

As part of the RI, three groups of sediment samples were collected.

- Group 1 consisted of three sediment samples, SD-020, SD-021, and SD-022, which were collected from the Rumford River backwash channel and sent offsite for laboratory analysis of SVOCs, metals, dioxins/furans, TOC/TCO, and grain size.

- Group 2 consisted of one sample in the Rumford River upstream of the site (SD-027) and one downstream of the site (SD-026). Samples were obtained from approximately 6 inches below water from the upper six inches of sediment and analyzed for SVOCs, dioxins/furans, AVS/SEM, metals, and TOC/TCO. Toxicity testing was also performed on these samples.

- Group 3 consisted of three sediment samples from Fulton Pond (SD-023, SD-024, and SD-025). These samples were obtained using a boat from the middle portion of the pond along a transect extending from the inlet of the pond to the outlet. Samples were obtained from the upper six inches of sediment using a small Ponar dredge. Water depth above sample SD-023 was 9 inches, and water depth above samples SD-024 and SD-025 was 12 feet. Samples were sent to an off-site laboratory for analysis of SVOCs, dioxins/furans, metals, TOC/TCO, and grain size.

2.8.3 Fish Tissue Sampling

Figure 2.8-3 shows the location of the fish samples that were obtained. Table 2.8-3 shows a summary of fish samples that were collected. Large fish, small fish, and crayfish samples were collected from the Rumford River and upstream and downstream ponds to evaluate the impact of Site contaminants on fish species.

On September 25, 2003, EPA and M&E collected samples of large fish likely to be consumed by humans from Bleachery Pond (a/k/a Glue Factory Pond), Fulton Pond, and Kingman Pond. All large fish were caught using the EPA electro-fishing boat. Largemouth bass were collected from Bleachery Pond and Kingman Pond, and white sucker and yellow perch were collected from Bleachery and Fulton Ponds. Whole body weights were recorded, and scales were scraped off the fish. Next, the fish were filleted, and the fillet and offal portions were weighed separately and recorded. Lastly, the fillet and offal portions were composited and packaged in aluminum foil, and then placed in a freezer at –30° C.

Small fish sampling was conducted in the Rumford River on October 16, 2003 and November 7, 2003. Fish samples were whole fish of a size likely to be consumed by piscivorous birds or mammals (approximately 4 to 8 inches in length). Small fish (white sucker and redfin pickerel) and crayfish were caught from upstream and on-site locations. The fish were caught using portable electro-fishing equipment. Fish and crayfish samples were weighed, homogenized, and placed in a freezer at –30° C.

Fish samples were analyzed for dioxins/furans, SVOCs (PAHs, biphenyl, and chlorophenols) , metals, and lipid content.

2.8.4 Benthic Invertebrate Community Analysis

In October 2003, M&E conducted a benthic macroinvertebrate study. Benthic macroinvertebrates were collected and enumerated from on-site and off-site locations within the Rumford River in accordance with the RBA-III protocols described in *Rapid Bioassessment Protocols for Use in Streams and Rivers, Benthic Macroinvertebrates and Fish*, and with any refinements described in *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers, Periphyton, Benthic Macroinvertebrates, and Fish.*

The study concluded that the on-site location, when compared to the off-site location, has a higher total abundance, density, evenness, presence of pollution sensitive species (EPT index), and lower number of taxa, and diversity; the on-site location is dominated by chironomids while the off-site location is dominated by oligocheates. However, the relative difference between these indices is relatively small, suggesting that both sites are similar in terms of benthic macroinvertebrate community. Both the on-site and off-site locations appear to have experienced biological impairment.

2.9 Laboratory Analysis

Several different laboratories conducted analysis of environmental samples collected during the Remedial Investigation. Some of the laboratory services were provided through EPA, under a separate contract (Routine Analytical Services, RAS) used to provide laboratory services for EPA fund-lead projects. For other laboratory analyses not provided under the EPA RAS contract, M&E prepared analysis specifications and procured laboratories, under a separate Delivery of Analytical Services (DAS) work assignment from EPA.

3.0 Physical Characteristics of the Study Area

3.1 Regional Characteristics

3.1.1 Hydrology

The site lies within the Taunton River Basin which drains approximately 528 square miles and empties into the Narragansett Bay at Fall River, Massachusetts. The river is impacted approximately 25 miles inland by tidal influences. Seventy-three square miles of the basin are covered with surface water. The various swamps, ponds, and lakes have formed as the result of glaciation. The glacial drift, which is deposited throughout much of the basin, is highly permeable and is composed of fine to coarse sandy gravel with lenses of sand, silt, and clay.

Deposition of this material in glacial valleys has provided thick sequences of permeable material which are a major source of ground water for public water systems.

The Rumford River flows north to south and is primarily fed by the Glue Factory Pond which is located approximately 1 mile north of the site. The site is generally divided into eastern and western portions by the Rumford River.

The Rumford River's downstream water pathway flows through Fulton, Kingman, and Cabot Pond and then into the Norton Reservoir at approximately 3.5 miles from the site. The river exits the reservoir on the southeast side and joins with the Wading River at approximately 8.7 miles from the site, which joins with the Threemile River at approximately 1 mile southeast. The 15 mile water pathway ends approximately 5 miles down the Threemile River, which eventually flows into the Taunton River.

3.1.2 Surficial Geology

The Site is located within the Mohawk division of the New England physiographic province where numerous tectonic events have created a highly complex geologic region. Regionally, areas of Massachusetts are geologically characterized by largely unconformable, exposed metamorphic and igneous bedrock (Dedham granite). This area is further deformed and complicated by major faults and folds and sedimentary rocks from the major depositional area, the Narragansett Basin (Rhode Island Formation). The unconsolidated deposits overlying the bedrock throughout much of the Narragansett Basin, are composed of till from the various glacial episodes. In some areas, this till layer is approximately 15 feet thick.

3.1.3 Bedrock Geology

Figure 3.1-1 shows the bedrock geology present on the site and the surrounding areas. Regionally, there are two prominent bedrock formations in the vicinity of the site. The uppermost bedrock unit at the site is mapped as the Rhode Island Formation of the Pennsylvanian. This formation is characterized as a sedimentary rock of sandstone, greywacke, shale and conglomerate. The Dedham Granite Formation contact with the Rhode Island Formation is approximately 1 mile north of the site. The Dedham Granite Formation is a light pink to greenish-gray, granular to slightly porphyritic granite. Faults in the underlying crystalline bedrock near the border of the Narragansett Basin trend north-northeast and their impact appears to diminish towards the basin due to the depth of the overlying sedimentary formations. The east-northeast trending Mansfield Syncline lies to the south of the Hatheway and Patterson facility and has a south-southeast dip, thus exerting a gentile dip in the Rhode Island Formation also to the south-southeast.

3.1.4 Meteorology

Mansfield is located in the Central Climatological Division of Massachusetts. Historical precipitation data are available from a recording site within Mansfield. Monthly precipitation data range from a high of 4.51 inches in November to a low of 3.31 inches in February. The annual average precipitation is 45.54 inches.

Taunton, located approximately 12 miles to the southeast of Mansfield, is the nearest location where temperature climatological data are recorded. Due to the proximity of Mansfield to Taunton, the similarity of topography, and the distance from coastlines, temperature data recorded at Taunton could be considered representative of conditions at Mansfield. Monthly average temperatures range from 28.6° F in January to 71.5° F in July with an annual average of 49.6° F.

Wind data are available from three regional airports: Worcester and Boston, MA and Warwick, RI. Wind data at Boston's Logan Airport, located 30 miles northeast of Mansfield, is occasionally influenced by a predominantly southeasterly sea breeze that occurs during the mid-day hours of warm weather months under certain meteorological conditions. This phenomenon occurs on a local scale and rarely extends more than a few miles inland. During a sea breeze, the data recorded at Logan airport may not be representative of wind conditions further inland.

The recording instrumentation location at Logan is exposed to at least a partial trajectory over open water in most easterly directions such that higher winds are experienced at Logan Airport than locations further inland for winds in the noted directions. The predominant annual mean wind speed and direction is 13 miles per hour from the west-northwest. West-southwest or south-southwest winds predominate during the months of May through August at mean speeds of 11 or 12 miles per hour.

T. F. Green Airport is located in Warwick, RI, just south of Providence and about 30 miles south-southwest of Mansfield. Narragansett Bay is located nearby to the south and east of the airport. Under optimal conditions, this water body could result in a sea breeze being established such that the recorded wind speed and direction data at the airport would not be representative of conditions further from the water. The prevailing wind direction for every month of the year is west-northwest with the monthly mean speeds in the range of 9 to 12 miles per hour.

Worcester Regional Airport, some 40 miles northwest of Mansfield, is located at an elevation of approximately 1,500 feet above mean sea level. While the Worcester site would not be affected by sea breezes due to its distance from the coast, it is a relatively exposed site with little nearby higher terrain that, as a result, may experience somewhat higher wind speeds than other less exposed sites. Similar to T. F. Green Airport, the prevailing wind direction at Worcester Airport is west-northwest for every month of the year, with average monthly mean speeds falling in the range of 9 to 13 miles per hour.

Mansfield is located within the triangle formed by the regional airports. It appears for reasons presented above that data from the Worcester Regional Airport would be most representative of the conditions expected in Mansfield of the three candidate sites.

3.2 Site Characteristics

3.2.1 Historic Site Development

Historic aerial photographs were examined to identify areas of past potential source areas and other features that were suggestive of possible contaminant releases. A summary of those findings is presented below.

3.2.1.1 1935

Figure 3.2-1 shows an aerial photograph taken of the site in 1935. At this time, the Hatheway & Patterson site did not exist. The area that would eventually become the Operations Area is occupied largely by railroad sidings. The original course of the Rumford River is highlighted. There are two buildings located to the right of the property boundary

3.2.1.2 1951

Figure 3.2-2 shows a clearer aerial photograph of the site from 1951. This photograph shows the same features as were observed in 1935, indicating no significant development during the intervening time.

3.2.1.3 1956

Figure 3.2-3 shows a photograph of the site taken in 1956. This photograph shows that the Rumford River course has been altered. Reportedly, the course of the river was channelized and re-routed in conjunction with a bridge construction project adjacent to the site. The downstream reach of the former Rumford River course is now abandoned, and the Rumford River now flows off the bottom of the page. White areas on the banks of the river appear to be spoils from the river excavation activity.

In the Operations Area, the first observable site development related to the Hatheway & Patterson corporation is evident. Several buildings and piles of treated lumber are apparent. The areas used for "dripping" do not appear to be paved at this time. The numerous railroad sidings that were present in 1951 have been reduced to one or two tracks through the site.

3.2.1.4 1961

Figure 3.2-4 shows the site in 1961. Significantly more activity is observable on the portion of the site located between County Road and the railroad tracks where several piles of lumber are present.

3.2.1.5 1965

Figure 3.2-5, portraying the site in 1965, appears to show the site in a similar state to that in 1961 except that there are several elliptical dark stains in the Operations Area, and there appears to be a dark line running from these dark stained areas across the tracks to the other part of the property. The drip areas still do not appear to be paved.

3.2.1.6 1972

Figure 3.2-6 shows the site in 1972. The significant difference in this photograph is that at least one dricon fire retardant tank appears to be present left of the Rumford River.

3.2.1.7 1980

Figure 3.2-7 shows the site with extensive activity in 1980. All three dricon tanks are present, there are several stacks of lumber on the site and there appear to be some dark stained areas.

3.2.1.8 1985

Figure 3.2-8 shows a color photograph of the site taken in 1985. The photograph shows a path in the woods in the portion of the site located below the tracks. The Stacker Building is now present and the drip areas now appear to be paved.

3.2.1.9 1990

Figure 3.2-9 shows that the site activities in 1990 had fully expanded to the area below the tracks in an area that has been cleared of trees. The two wood drying buildings are now present and there are several stacks of lumber located across most of the unvegetated portions of the property.

3.2.1.10 1995

Figure 3.2-10 shows the site as it was in 1995. By this time, the Hatheway & Patterson Corporation had gone out of business and vacated the site. The buildings below the tracks were removed and all of the lumber piles are gone.

3.2.1.11 2001

Figure 3.2-11 shows the most recent aerial photograph of the site. This photograph shows the condition of the site after completion of the EPA Time Critical Removal Action.

3.2.2 Geology

3.2.2.1 Soil

Figure 3.2-12 shows the surficial geology present on the site and the surrounding areas. The unconsolidated deposits overlying the bedrock throughout much of the Narragansett Basin are composed of till from the various glacial episodes. The site lies in this Narragansett Basin area. Erosion on site has led to the replacement of this till unit with recent alluvial deposits composed of sand and gravel channel deposits. The surficial geology at the site is composed of these alluvial materials. Development at the site has led to the surficial alluvium being replaced or reworked with fill consisting of cinder, ash, brick and occasionally wood/sawdust. The fill layer across the site ranges from approximately 3 to 8 feet thick. There are some sporadic silt deposits between the fill layer and sand and gravel unit. The sand and gravel unit across the site ranges from approximately 5 feet to greater than 40 feet in the southeastern portions of the site.

Selected subsurface soil samples (SB-001, SB-003, SB-010, and SB-012) collected during the RI were analyzed for TOC content to provide data for contaminant transport and risk assessment analysis. The results of these analyses are summarized in Appendix I. The TOC content in shallow subsurface soil samples (1 foot to 4 feet) range from 1,400 mg/kg (SB-012) to a maximum of 23,100 mg/kg (SB-010); and TOC content in deeper subsurface soil samples (4 feet to 10 feet) range from 549 mg/kg (SB-012) to a maximum of 12,600 mg/kg (SB-010). The implications of the TOC values with respect to contaminant transport are discussed in Section 5.0.

The relatively high TOC values detected at SB-010 likely reflect the presence of the presence of contamination as SB-010 is located in an area where elevated concentrations of Site contaminants, including LNAPL, were detected.

3.2.2.2 Bedrock

Figure 3.2-13 shows the elevation of the bedrock surface at the site. Figure 3.2-14 shows 3 cross sections depicting subsurface geology at the site. The uppermost bedrock unit at the site is the Rhode Island Formation. Bedrock slopes from north to south across the site from an elevation of approximately 172 feet MSL to an unknown elevation below 135 feet MSL. Ground level at the site is at an elevation of approximately 178 feet MSL. There are a few bedrock outcrops located in the southern portions of the site.

3.2.3 Hydrogeology

3.2.3.1 Ground Water Elevation and Flow Direction

Tables 3.2-1 and 3.2-2 show measurements, including reference elevations, LNAPL thickness, and elevation for overburden and bedrock monitoring wells, respectively. Ground water elevations show that the average annual depth to ground water is generally less than 15 feet. The saturated interval was encountered at an approximate depth of 9 feet below grade throughout the site. At those locations where bedrock was found closer to ground surface, the saturated interval was elevated, generally 3 feet to 6 or 7 feet below grade.

Ground water flow direction on the property is generally southwesterly, toward the Rumford River. A low laying marsh area, the Rumford River backwash, is located just south of the southern site boundary. Depth-to-water measurements were taken prior to RI Phase I and Phase II ground water sampling rounds.

Figures 3.2-15 through 3.2-18 show maps of water table and potentiometric surfaces for overburden and bedrock ground water bearing units based on the ground water elevation measurements. In general, the direction of ground water flow in the overburden and bedrock is to the southwest. This is consistent with what would be inferred based on topography and the existence of regional drainage features, namely flow towards the Rumford River. Overall, Site ground water flow directions are consistent with the regional ground water flow, and reflect the influence of the Rumford River.

3.2.3.2 Hydraulic Conductivities

On June 9, 1999, Resource Controls performed two in-situ variable-head ("rising head") tests each in monitoring wells RCA-2 and RCA-9 and one rising head test in MW-10. A summary of calculated hydraulic conductivity values is presented in Table 3.2-3.

3.2.3.3 Transmissivities

Transmissivity is a measure of the amount of water that can be transmitted horizontally through a unit width by the full saturated thickness of the aquifer under a unit gradient and is dependent on the hydraulic conductivity and the saturated thickness of the soil. Hydraulic conductivities and saturated soil thicknesses are used to estimate the transmissivity of Site soils and identify zones of greater potential for ground water flow and dissolved contaminant transport.
Aquifer transmissivity is calculated as follows:

$$T = K{*}b{*}c$$

Where:

T = transmissivity (ft^2/day)
b = saturated thickness of aquifer (ft)
c = conversion factor (0.033 ft/cm x 86,400 sec/day)
k = hydraulic conductivity (cm/sec)

Table 3.2-4 shows a summary of transmissivity calculations for the tested wells. Based on ground water levels and depths-to-bedrock measurement, saturated thicknesses at the tested well locations range from 0.99 to 15.08 feet. Estimated transmissivities on the Site range from approximately 17 to 146 ft^2/day.

3.2.3.4 Horizontal Hydraulic Gradients

TRC estimated horizontal hydraulic gradients for overburden ground water based on December 2003 ground water levels. In general, apparent horizontal hydraulic gradients increase from north of the railroad tracks to areas south and southwest. This is apparently due to the bedrock outcrop present on the south side of the railroad tracks. Horizontal gradients in overburden ground water range from 0.007 to 0.025 ft/ft, with an overall average gradient of approximately 0.020 ft/ft. Average horizontal gradients in bedrock ground water are approximately 0.015 ft/ft, similar to overburden ground water.

3.2.3.5 Horizontal Seepage Velocities

Estimated average horizontal seepage velocity (v_h) for ground water flow in overburden (typically fine to coarse sand) is approximately 0.24 ft/day. This estimate is based on the horizontal hydraulic gradient (i_h), the upper end of the range of estimated hydraulic conductivities (K), and assumed porosity (n) of 0.23 for the overburden, and used in the Darcy Relationship presented below.

$$v_h = \frac{Ki_h}{n} = \frac{(9.9x10^{-3})(0.02)}{0.23} = 8.6x10^{-5} cm/\sec\ (2.4\ feet/day)$$

The estimated seepage velocity provides an approximation of the advective rate of travel for ground water and conservative (i.e., non-retarded) dissolved contaminants, neglecting the effects of dispersion. It is useful in estimating contaminant arrival times from source areas to downgradient receptors and will be discussed further in Section 5.0 Contaminant Fate and Transport.

3.2.3.6 Vertical Hydraulic Gradients

Vertical hydraulic gradients were estimated using the December 2002 and December 2003 water level measurement at two locations. Downward hydraulic gradients from overburden to bedrock were observed in well couplets MW-008A/MW-008B and MW-009A/MW-009B, located in downgradient areas of the Site south of the railroad tracks. Well couplet MW-008A/MW-008B exhibited a downward gradient of 0.005 ft/ft, and well couplet MW-009A/MW-009B exhibited a downward gradient of 0.01 ft/ft.

3.2.3.7 Ground Water Use and Value

Appendix RR presents a letter from the MADEP indicating that the use and value for site ground water is "low." No potable wells are located in the area, but there are three non-potable wells located on Highland Avenue (see Appendix SS).

3.2.4 Hydrology

The Rumford River divides the site into eastern and western portions. The river flows generally from north to south within the main facility area. The channel has been altered several times in recent history by human activity. The original channel bed was changed to permit construction of the railroad. The flow system was again altered in 1945 to allow for preparation of a major highway underpass. At this time a short reach of the river, now referred to as the backwash channel, was abandoned. The bridge area through which the present channel flows is lined with granite blocks.

According to Massachusetts Water Quality Standards, the Rumford River is a Class B surface water. Class B waters are designated as habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation. Where designated, Class B waters are suitable as a source of public water supply with appropriate treatment. Class B waters are also suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. Class B waters shall have consistently good aesthetic value.

Based on the Flood Insurance Rate Map, portions of the site are located within areas of the 100-year flood zone (Zone A3) and between limits of the 100-year flood and 500-year flood zone (Zone B) for the Rumford River. Figure 3 shows the boundaries of the flood zones.

The average flow rate of the Rumford River through the site is approximately 10 cubic feet per second.

Figure 1.2-1 shows the locations of catch basins and manholes that were identified on the site, as well as a septic system. Drain lines and utilities connect some of the existing catch basins and manholes. Several of the existing catch basins are dry wells, with several of the other catch basins appearing to connect solely to one of these dry wells. All catch basins, except for CB-1, were verified visually by opening the structure and viewing inlets and outlets. MH-4 was identified as part of the septic system.

3.2.5 Ecology

Figure 3.2-21 shows the approximate location of the three main habitats observed at the Hatheway and Patterson site plus the location of the wetlands boundary. The habitat information on this map was compiled from field observations made by TRC wetland scientists and the wetland boundary as delineated by M&E wetland scientists (M&E, 2004).

- forest (palustrine and mixed upland)
- successional field
- aquatic (riverine and open water).

Figure 3.2-21 also shows the location of potential vernal pool habitat areas identified in the southern portion of the site in a follow-up survey conducted in the spring of 2002 (M&E, 2002). All vernal pools were formed in natural swales or depressions. VP C2 was formed in the pit resulting from a tree blowdown. The substrate in each pool consisted of a leafy layer overlying a spongy forest floor that; when disturbed, the substrate often omitted a sulfur odor. At the time of the survey, much of the forest floor was saturated or inundated. However, many inundated depressions wee not classified as vernal pools because at the time of the survey, the depressions contained outlets that connected to the Rumford River or its backwash channel, and were therefore susceptible to fish activity.

The number of vernal pools on site may vary from year to year. In wetter years, some of the inundated depressions identified as vernal pools in the M&E survey may connect to the Rumford River and the backwash channel. Likewise, depressions which possessed outlets during the survey may be isolated from the river in drier seasons.

Though wood frogs and American toads were recorded at the site during the September 2001 habitat survey, spring peepers were the only amphibians observed at the site during the 2002 vernal pool survey. Peeper calls originated from inundated areas along the Rumford River. Tadpoles were not observed in the vernal pools.

Ambystomid salamander egg masses, spermatophores, or individuals (particularly yellow spotted salamanders which are common in Massachusetts), all which would be expected to be present given the extensive forest community surrounding the vernal pools, were not observed at any point during the survey. Unknown biotic or abiotic factors could have prevented the salamander populations from successfully breeding by the time the vernal pool survey took place in early spring, 2002. Further study, including the survey of vernal pools upstream from the Site, would be needed to explain the apparent absence of ambystomid salamanders at the Site.

4.0 Nature and Extent of Contamination

This section presents a discussion of the types of contaminants that were detected in each of the separate media at the Site.

Each of the following sections presents tables of the contaminants that were detected together with the concentrations. Separate tables are presented for each group of contaminants (i.e., volatile organic compounds [VOC], semi-volatile organic compounds [SVOC], metals/cyanide, pesticides/polychlorinated biphenyls [PCB], dioxins, etc.). If a particular group of contaminants was not detected for any of the samples in a given study area, no table is presented. Also, the tables only list analytes that were detected in one or more samples. Analytes that were not detected in any sample are not included in the tables, and the contaminant concentration for other analytes that were not detected are simply listed as blank and the tables do not include detection limits for any constituent.

Table 4.0-1 lists the screening/action levels used in this report to evaluate contaminant levels. The tables list certain relevant action levels and benchmarks that were used to evaluate whether the reported concentrations were significant or potentially problematic.

- ***Soil:*** The criteria used for surface and subsurface soil samples are the EPA Region IX Preliminary Remediation Goals (PRGs) for Industrial Soil, dated October 2002.

- ***Sediment:*** The primary screening criteria used for sediment samples are the National Ocean and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SQuiRTs) for Organics and Inorganics (Freshwater Sediment TEL), dated September 1999. For compounds without a NOAA TEL concentration, benchmark concentrations from the following documents, in order, were used:

  - Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment - Associated Biota: 1997 Revision.

  - Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volume 1, EPA 1999. (Freshwater Sediment Toxicity Reference Values).

  - Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, Ontario Ministry of the Environment, 1993. (Lowest Effect Levels).

- ***Ground Water:*** The criteria used for screening of ground water samples are the Federal Maximum Contaminant Levels (MCLs).

- ***Surface Water:*** The primary screening criteria used for surface water are the Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revisions by G. W. Suter II and C. L. Tsao (Tier II Values: Secondary Chronic value). For compounds without a specified Tier II value, benchmark screening values from the following documents were used:

  - National Recommended Water Quality Criteria for Priority Toxic Pollutants (Freshwater CCC), November 2002

  - Water Quality Criteria Summary Concentrations, EPA 1994

  - Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revisions (NAWQ Criteria).

- ***Fish Tissue:*** The primary criteria used for screening fish tissue sample results are the Lowest Chemical Specific No Observed Adverse Effect Level (NOAEL) concentrations for fish, mussel, fish-eating birds or fish-eating mammals developed by the Army Soldier System Center (SSC) of Natick, Massachusetts. Secondary criteria for screening fish sample results are the EPA Region 3 risk-based concentrations for human health.

Appendices B through NN present a complete tabulation of all laboratory test results obtained during the Remedial Investigation and other previous investigations. The appendices contain all of the results, all of the analytes and all of the data qualifiers.

4.1 Soil

Samples were collected from surface and subsurface soils to characterize the nature of contamination. A summary of findings is presented below.

Tables 4.1-1 and 4.1-2 present the results of PCP and metals screening respectively.

4.1.1 Distribution of Contaminants in Surface Soil

Table 4.1-3 presents a summary of the compounds that were detected in surface soil.

4.1.1.1 VOCs

Only two surface soil samples, MW-010 and MW-011, collected in 1989, were analyzed for VOCs. Benzene was detected in both samples, and toluene and xylene were detected in MW-010 at concentrations below soil screening levels.

4.1.1.2 SVOCs

PCP and several PAHs [benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and benzo(a)anthracene] were detected in surface soil samples at concentrations exceeding soil screening levels.

Figure 4.1-1 shows a map of interpreted PCP concentrations in surface soil. The highest concentrations of PCP were detected in the operations area in vicinity of the Cylinder No. 01 and

02 Building. The highest concentration of PCP was detected in surface soil sample HP4-H at 4,900 mg/kg, which exceeds the soil screening level of 9 mg/kg. While PCP was detected in surface soils at other on-site areas, based on available data, exceedances of the soil screening levels for surface soils appear to be limited to the operations area.

The highest concentrations of PAHs were detected in surface soil samples SS-030 and SS-031, located on County Street across from the Site. These elevated concentrations are likely due to the proximity to the asphalt roadway. The highest on-site concentrations of PAHs in surface soil samples were detected at SS-022 located in the northwest portion of the Site in the vicinity of the drying area.

4.1.1.3 Metals

Arsenic, chromium, iron, lead, and thallium were detected in surface soil samples at concentrations exceeding soil screening levels.

Figure 4.1-2 shows a summary of arsenic concentrations detected in surface soil. The highest on-site concentrations of arsenic and chromium were detected in the operations area. The highest concentrations of arsenic (1,860 mg/kg) and chromium (2,230 mg/kg) were detected at location SS-058 in the vicinity of the Cylinder No. 03 Building and CCA drip pad. These concentrations exceed the soil screening levels of 1.6 mg/kg for arsenic and 450 mg/kg for chromium. Elevated concentrations of arsenic (1,200 mg/kg) and chromium (950 mg/kg) were also detected in surface soil sample HP4-G, located adjacent to the Cylinder No. 01 and 02 Building. An elevated concentration of arsenic was also detected at HP1-M5, located in the northwest portion of the Site in the vicinity of the drying area, at a concentration of 630 mg/kg. .

Figure 4.1-3 shows a summary of lead concentrations detected in surface soil. The highest on-site concentrations of lead in surface soil were detected in the vicinity of the DRICON drip pad. Lead was detected in surface soil sample SS-034 at a concentration of 731 mg/kg and in surface soil sample SS-033 at a concentration of 382 mg/kg, which exceed the soil screening level of 75 mg/kg. Concentrations of lead in surface soil in other areas of the Site range up to 288 mg/kg.

4.1.1.4 Dioxin TEQ

Figure 4.1-4 shows a summary of dioxin TEQ concentrations detected in surface soil. The highest concentrations of the dioxin TEQ in surface soil were detected in the operations area in the vicinity of the PCP Drip Pad. The dioxin TEQ (1998 TEQ) in surface soil sample SS-005 was at a concentration of 11,000J ng/kg, which exceeds the soil screening level of 16 ng/kg.

4.1.2 Distribution of Contaminants in Subsurface Soil

Table 4.1-4 shows a summary of compounds that were detected in subsurface soil.

4.1.2.1 VOCs

No exceedances of soil screening levels were detected in pre-RI subsurface soil samples analyzed for benzene, toluene, and xylene. Benzene was detected in only one subsurface soil sample, MW-012 (6-8 feet) at 109 ug/kg, which is below the soil screening level of 1,300 ug/kg. Toluene was detected in subsurface soil samples B-013-89 (5-7 feet) and B-016-89 (5-7 feet) below the soil screening level of 220,000 ug/kg at concentrations of 23.82 and 39.84 ug/kg, respectively. Xylene was detected in several subsurface samples. The highest concentration of xylene was detected in sample MW-002 (6-8 feet), located between the Mill Building and the railroad tracks, at 8,100 ug/kg. Detected concentrations of xylene do not exceed the soil screening level of 90,000 ug/kg.

4.1.2.2 SVOCs

Figures 4.1-5 and 4.1-6 show PCP concentrations that were detected in shallow and deeper subsurface soil, respectively. PCP, 2,4-dinitrophenol, and benzo(a)pyrene were detected in subsurface soil at concentrations exceeding soil screening levels.

The highest concentration of PCP was detected in the vicinity of the PCP drip pad in sample GP-013 (2-4 feet) at a concentration of 1,100 mg/kg, which exceeds the soil screening level of 9 mg/kg. Elevated concentrations of PCP were also detected at deeper depths in the operations area and on the opposite side of the railroad tracks. PCP was detected in sample B-006-88 (6-8 feet) at a concentration of 490 mg/kg near the Kiln Building and was also detected in sample GP-028 (6-8 feet) at a concentration of 710 mg/kg west of the former wood storage building paved area.

In sample B-008-88 (6-8 feet), 2,4-Dinitrophenol was detected at a concentration of 251 mg/kg, which exceeds the soil screening level of 120 mg/kg. 2,4-Dinitrophenol was detected in other samples below the soil screening level.

Concentrations of benzo(a)pyrene were detected above the soil screening level of 210 ug/kg in three subsurface samples. Benzo(a)pyrene was detected in operations area samples GP-14 (6-8 feet) at 400 ug/kg and GP-16 (6-8 feet) at 560 ug/kg. One other exceedance of benzo(a)pyrene was detected in sample GP-005 (2-4 feet) at a concentration of 360 ug/kg north of the DRICON drip pad.

4.1.2.3 Metals

Arsenic, chromium, iron, and lead were detected in subsurface soil samples at concentrations exceeding soil screening levels.

Figures 4.1-7 and 4.1-8 show the arsenic concentrations detected in shallow and deeper subsurface soil, respectively. The highest on-site concentrations of arsenic and chromium in subsurface soil were detected in the operations area. The highest concentrations of arsenic (540 mg/kg) and chromium (530 mg/kg) were detected at location GP-012 (2-4 feet) located northeast of the CCA drip pad. These concentrations exceed the soil screening levels of 1.6 mg/kg for arsenic and 450 mg/kg for chromium. Elevated arsenic concentrations were also detected in sample MW-003 (6-8 feet) at 140 mg/kg, located at the edge of the PCP Drip Pad and in sample RCA-6 (4-6 feet) at 60 mg/kg, located next to the CCA Sump. The highest concentration of arsenic on the other side of the railroad tracks was detected in sample SB-010 (1-4 feet) at 55.1 mg/kg, located at the edge of the paved area.

Figures 4.1-9 and 4.1-10 show lead concentrations in shallow and deeper subsurface soil, respectively. The highest on-site concentrations of lead in subsurface soil were detected in the vicinity of the former wood storage area located in the southwest portion of the Site. Lead was detected in sample SB-008 (1-4 feet) at a concentration of 710 mg/kg and in sample SB-007 (4-10 feet) at a concentration of 85.1 mg/kg, which exceed the soil screening level of 75 mg/kg. Elevated concentrations of lead were also detected in SB-003 (1-4 feet) at 235 mg/kg, located in the vicinity of the PCP Drip Pad and in SB-004 (1-4 feet) at 139 mg/kg, located west of the DRICON Operations Area.

4.1.2.4 Dioxin TEQ

Figures 4.1-11 and 4.1-12 show the dioxin TEQ concentrations in shallow and deeper subsurface soil, respectively. Elevated concentrations of the dioxin TEQ in subsurface soil were detected in both the operations area and across the railroad tracks next to a former wood storage building. The highest subsurface soil concentration of the dioxin TEQ (1998 TEQ) was next to the former wood storage building area in sample SB-010 (4-10 feet) at a concentration of 2,600J ng/kg. A lower concentration of 200J mg/kg was detected in a deeper sample at the same location, SB-010 (1-4 feet). Elevated concentrations of dioxin were also detected in shallow and deeper subsurface soil samples from operations area samples SB-001 and SB-002, located near the CCA and PCP drip pads, ranging from 11J to 480J ng/kg.

4.2 Ground Water

Tables 4.2-1 and 4.2-2 present summaries of compounds detected in overburden and bedrock ground water, respectively.

4.2.1 Distribution of Contaminants in Overburden Ground Water

PCP, arsenic, chromium, and dioxin were detected in overburden ground water samples at concentrations exceeding ground water screening criteria.

Figure 4.2-1 shows a map of interpreted PCP concentrations in overburden ground water. The highest concentration of PCP detected during the RI was during the Phase I sampling round in piezometer PZ-007 at a concentration of 17,000J ug/L, exceeding the ground water screening criterion of 1 ug/L. PZ-007 is located at the edge of the former wood treatment building paved area. The detected PCP concentration in PZ-007 in the following Phase II sampling round dropped to 7,200 ug/L. The highest detection of PCP in the Phase II sampling round was from well MW-006 at a concentration of 9,400 ug/L. Concentrations of PCP at downgradient monitoring wells located in the western and southern portion of the Site, although decreasing, are still greater then the ground water screening criterion of 1 ug/L.

Figure 4.2-2 shows a map of arsenic concentrations in overburden ground water. The highest concentration of arsenic detected during the RI was during the Phase II sampling round in MW-003 at a concentration of 940 ug/L, exceeding the ground water screening criteria of 10 ug/L. MW-003 is located at the edge of the PCP Drip Pad in the operation area.

Figure 4.2-3 show a map of the dioxin TEQ concentrations in overburden ground water from the Phase I sampling round. Ground water dioxin analyses were performed for Phase I overburden monitoring well samples only. The highest concentration of the dioxin TEQ (1998 TEQ) was detected in well MW-005A at a concentration of 1.9J ng/L, exceeding the ground water screening criteria of 0.00003 ng/L. MW-005A is located across the railroad tracks from the PCP Drip Pad in the operation area.

4.2.2 Distribution of Contaminants in Bedrock Ground Water

PCP, benzo(a)pyrene, arsenic, and dioxin were detected in bedrock ground water samples at concentrations exceeding ground water screening criteria.

Figure 4.2-4 shows PCP concentrations in bedrock ground water. The highest concentrations of PCP and arsenic in bedrock ground water were detected in downgradient monitoring wells. PCP was detected in well MW-101R, located in the vicinity of the former wood treatment building paved area, at 3,100 ug/L, and in well MW-009B, located in the southeast portion of the site, at 990 ug/L. These concentrations exceed the ground water screening criterion of 1 ug/L. The PCP plume does not appear to extend beyond the site boundary based on the fact that no PCP was detected in the down-gradient off-site wells MW-107R and MW-109R.

Figure 4.2-5 shows arsenic concentrations in bedrock ground water. Similar to PCP, the highest concentration of arsenic was detected in MW-101R at 37 ug/L. Elevated arsenic concentrations were also detected in downgradient monitoring wells MW-105R, MW-008B, and MW-009B at 8.8, 10.6, and 9.2 ug/L, respectively. The arsenic plume does not appear to extend beyond the site boundary based the low concentrations (below the MCL) of arsenic in the down-gradient off-site wells MW-107R and MW-109R.

4.3 Sediment

Table 4.3-1 presents a summary of compounds detected in upstream, on-site, and downstream sediment.

4.3.1 Distribution of Contaminants in Upstream Sediment

Figure 4.3-1 shows the detected concentrations of PCP, arsenic, cadmium, chromium, copper, lead, and dioxin in upstream and downstream samples.

4.3.1.1 VOCs

Six VOCs (1,1-Dichloroethene, trans-1,2-Dichloroethene, 1,1-Dichloroethane, cis-1,2-Dichloroethene, trichloroethene, and xylene) were detected at location SD-019, located downstream of Glue Factory Pond, at concentrations exceeding sediment screening criteria.

4.3.1.2 SVOCs

PAHs including naphthalene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene were detected in upstream sediment samples at concentrations exceeding sediment screening criteria. In general, the highest concentrations of PAHs in upstream samples were detected at location SD-018, located downstream of Glue Factory Pond.

Three additional SVOCs, 2-methylphenol, phenol, and dibenzofuran were detected above sediment screening criteria in upstream sediment samples from location SD-018.

4.3.1.3 Metals

Ten metals (arsenic, barium, cadmium, copper, lead, manganese, nickel, selenium, silver, and zinc) were detected in upstream sediment samples at concentrations exceeding sediment screening criteria. In general (except for metals), the highest concentrations of oil in upstream samples were detected at location SD-018, located downstream of Glue Factory Pond.

- Arsenic in upstream sediment samples range from 0.29 mg/kg at SD-016 to 8.5 mg/kg at SD-018.
- Lead in upstream sediment samples range from 6.7 mg/kg at SD-016 to 144 mg/kg at SD-018.
- Chromium in upstream sediment samples range from 5.6 mg/kg at SD-016 to 23.8 mg/kg at SD-018. These concentrations are below the sediment screening criterion of 37.3 mg/kg.

4.3.1.4 Pesticides/PCBs

Several pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, endosulfan II, and endrin) and PCBs (Aroclor 1254) were detected in upstream sediment samples at concentrations exceeding sediment screening criteria. In general, the highest concentrations of pesticides and PCBs in upstream samples were detected at location SD-018, located downstream of Glue Factory Pond.

4.3.1.5 Dioxin TEQ

The dioxin TEQ (1998 TEQ) in upstream sediment samples ranged from ND to 12J ng/kg at SD-018, which is below the sediment screening criterion of 410 ng/kg.

4.3.2 Distribution of Contaminants in On-Site and Downstream Sediment

4.3.2.1 VOCs

Four VOCs (acetone, carbon disulfide, toluene, and xylene) were detected above sediment screening criteria in on-site sediment samples. These compounds are likely attributable to laboratory contamination.

The highest on-site concentration of toluene in sediment was detected at location SD-013, located in an upstream location adjacent to County Street. A toluene concentration of 100 ug/kg was detected in SD-013, which exceeds the sediment screening criterion of 50 ug/kg. Because of the location of this sample near the road, elevated toluene concentrations are likely due to runoff from County Street. Concentrations of toluene appear to decrease through the Operations Area as toluene was not detected in samples SD-010, SD-011, and SD-012. Further downstream, elevated toluene concentrations in excess of the sediment screening criterion were detected in SD-009, located near the ground water treatment system, and in SD-003, located in the Rumford River backwash channel.

4.3.2.2 SVOCs

The same PAHs detected in upstream sediment were detected in on-site sediment samples at concentrations exceeding sediment screening criteria. In general, the highest concentrations of PAHs were detected at location SD-013, located in an upgradient area of the Site. Other SVOCs detected above sediment screening levels are 2-methylphenol, dibenzofuran, diethyl phthalate, and PCP.

The highest concentration of PCP in sediment was detected in the on-site vernal pool sample VP-002 at 690 mg/kg, which exceeds the screening criterion of 0.36 mg/kg. PCP detected in on-site sediment samples from the Rumford River ranges from ND to 51 mg/kg. The highest concentration, 51 mg/kg, was detected at RRHPO3-5 located near the ground water treatment system. Concentrations of PCP in on-site sediment samples are presented in Figure 4.3-2. PCP in downstream sediment samples range from ND to 0.55 mg/kg at SD-024.

4.3.2.3 Metals

Eleven metals (arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, and zinc) were detected in on-site sediment samples at concentrations exceeding sediment screening criteria.

Figure 4.3-3 shows the results of arsenic in on-site sediment. The highest concentration of arsenic in on-site sediment was detected at location SD-026 at a concentration of 65 mg/kg, which exceeds the sediment screening criterion of 5.9 mg/kg. Sample SD-026 is located in the Rumford River next to the ground water treatment system. Based on arsenic data from samples SD-009, RRHP03-S, SD-011, and RRHP01, exceedances of the arsenic screening criteria extend upstream through the Operations Area. One exceedance was detected upstream of RRHP01 in sample SD-018 (8.5 mg/kg). Arsenic in sediment downstream of the Site ranges from ND to 27 mg/kg at SD-024.

Figure 4.3-4 shows the results of lead analysis in on-site sediment. The highest concentration of lead in on-site sediment was detected at location SD-022 at a concentration of 210 mg/kg, which exceeds the sediment screening criterion of 35 mg/kg. Sample SD-022 is the southernmost downstream sample collected from the Rumford River backwash channel. Lead was detected in all backwash channel sediment samples in excess of the sediment screening criterion. With the exception of backwash channel samples and upstream sample RRUS-S (10,200 mg/kg), lead concentrations in Rumford River sediment samples range from 16 to 66.1 mg/kg. The highest on-site concentration of lead was detected at the southern end of the Rumford River backwash channel. Concentrations of lead in sediment samples collected downstream of the Site range from 4.8 mg/kg at SD-015 to 440E mg/kg at SD-024.

4.3.2.4 Pesticides/PCBs

Several pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, endrin, and gamma-chlordane) were detected in on-site sediment samples at concentrations exceeding sediment screening criteria. In general, the highest concentrations of pesticides in on-site sediment were detected at location RRUS-S, located at an upstream location in the Rumford River just north of County Street. Based on the sediment testing data, exceedances of pesticides in sediment appears to be limited to upstream areas along County Street (locations RRUS-S, SD-012, SD-013 and SD-014) and in the vicinity of the backwash channel branch at sample locations SD-003, SD-007, SD-008, and SD-009, and SD-026.

PCBs were detected at locations SD-001, SD-003, SD-005, SD-007, SD-008, SD-013, and SD-014. The only exceedance of sediment screening criteria is at the backwash channel sample location SD-003. PCBs (Aroclor 1254) were detected at SD-003 at a concentration of 34.5J ug/kg, which slightly exceeds the sediment screening criterion of 34.1 ug/kg.

4.3.2.5 Dioxin TEQ

Figure 4.3-5 shows the results of the dioxin TEQ in on-site sediment. The highest concentrations of the dioxin TEQ were detected in on-site Rumford River sediment located downstream of the Operations Area between the railroad tracks and the ground water treatment system. Detected concentrations of the dioxin TEQ (1998 TEQ) exceed the sediment screening criterion of 410 ng/kg at three locations in this reach: RRHP02 (2,273J ng/kg), RRHP03-S (1,017J ng/kg), and SD-009 (1,200J ng/kg). Dioxin in downstream sediment samples range from ND to 200J ng/kg at SD-024.

4.4 Surface Water

Table 4.4-1 shows a summary of compounds detected in upstream, on-site, and downstream surface water.

4.4.1 Distribution of Contaminants in Upstream Surface Water

Figure 4.4-1 shows a map of PCP, arsenic, cadmium, chromium, copper, lead, and dioxin concentrations in upstream and downstream samples. Samples were collected from Rumford River upstream location SW-016 on three separate days – October 21, 23, and 27, 2003.

4.4.1.1 SVOCs

One SVOC, bis(2-ethylhexyl)phthalate, was detected at a concentration of 3 ug/L, which is equal to the surface water screening criterion. PCP was not detected in upstream surface water samples above the detection limit of 10 ug/L.

4.4.1.2 Metals

Barium, lead, and manganese were detected above surface water screening criteria. Lead in upstream surface water samples ranges from ND to 3.4 ug/L. The screening criterion for lead is 2.5 ug/L. Arsenic was not detected in upstream surface water samples above the detection limit of 4.1 ug/L.

4.4.2 Distribution of Contaminants in On-Site and Downstream Surface Water

4.4.2.1 VOCs

One VOC, 1,1,2-Trichloroethane, was detected at SW-007 at a concentration of 0.62 ug/L, which is below the screening criterion of 1,200 ug/L. No other VOCs were detected.

4.4.2.2 SVOCs

Figure 4.4-2 shows a map of PCP concentrations in on-site surface water samples. PCP and two PAHs [benzo(a)anthracene and benzo(a)pyrene] were detected above surface water screening criteria in on-site Rumford River surface water samples. The highest concentration of PCP in surface water was detected in on-site vernal pool sample VP-002 at 680 ug/L, which exceeds the screening criterion of 15 ug/L. Elevated concentrations of PCP were detected along the Rumford River from the ground water treatment system to just beyond the backwash channel. PCP was detected at concentrations up to 28 ug/L at location SW-007 during the Technical Assistance Effort. Historical sampling from 1989 indicates concentrations of PCP in backwash channel surface water up to 39.3 ug/L at location SW-2. PCP in downstream surface water samples ranges from ND to 11 ug/L at SW-004.

4.4.2.3 Metals

Five metals (aluminum, barium, iron, lead, and manganese) were detected above surface water screening criteria in on-site Rumford River surface water samples. In addition to these five metals, beryllium and/or cadmium were detected above surface water screening criteria in vernal pool samples VP-001 and VP-002. Barium, lead, and manganese were detected at similar concentration in upstream surface water samples indicating background conditions.

Figure 4.4-3 shows a map of concentrations of arsenic in on-site surface water. Arsenic in on-site surface water samples ranges up to 1.5J ug/L at SW-015, which is below the screening criterion of 150 ug/L. Similar to PCP, elevated concentrations of arsenic were detected along the Rumford River from the ground water treatment system to just beyond the backwash channel. Arsenic in downstream surface water samples was detected as 27 mg/kg at SD-024.

Figure 4.4-4 shows a map of concentrations of lead in on-site surface water. The highest concentrations of lead in surface water were detected in on-site vernal pool samples VP-001 and VP-002 at 11.3J and 8.6J ug/L, respectively, exceeding the screening criterion of 2.5 ug/L. Elevated concentrations of lead were detected along the Rumford River from the ground water treatment system to just beyond the backwash channel. Lead was detected at concentrations up to 5.9 ug/L at location SW-008. Lead in downstream surface water samples ranges from ND to 0.27 ug/L at SW-001.

Cyanide was detected in one on-site sample, SW-014 at a concentration of 9.2J ug/L, which exceeds the screening criterion of 5.2 ug/L. Cyanide was not detected in any other surface water samples.

4.4.2.4 Pesticides/PCBs

Neither pesticides nor PCBs were detected in on-site surface water samples. Four pesticides (lindane, dieldrin, endrin, and 4,4'-DDT) were detected in surface water sample FP collected from Fulton Pond in 1998. Lindane and 4,4'-DDT were detected at concentrations slightly above surface water screening criteria.

4.4.2.5 Dioxin TEQ

Figure 4.4-3 shows a map of concentrations of the dioxin TEQ in on-site surface water. The dioxin TEQ in on-site surface water samples range from ND at an upstream location near County Street to 0.009 ng/L at SW-007, located slightly downstream of the backwash channel junction. The dioxin screening criterion for surface water is 0.01 ng/L. The dioxin TEQ in downstream surface water samples ranges from ND to 0.00057J ng/L at FP.

4.5 LNAPL

4.5.1 LNAPL Extent

LNAPL ranging from a sheen to several inches of LNAPL was observed in overburden wells MW-002, MW-005A, MW-006, MW-012, RCA-7, MW-D, MW-E, and MW-F during the Technical Assistance Effort through Phase II and the RI. The greatest accumulation of LNAPL, 1.13 foot, was observed in well MW-012. Measured LNAPL thickness is presented in Figure 4.5-1. LNAPL was not observed in bedrock monitoring wells.

Table 4.5-1 summarizes the CPT survey results, including FFD response and Video-CPT observations.

Figure 4.5-2 shows a map of the estimated smear zone delineation based on the CPT investigation. The posted thickness of LNAPL-impacted soil is based on the cone-penetrometer survey (Appendix QQ). This map shows the estimated thickness of vadose zone soil that has residual oil in the pore spaces. Based on the cone penetrometer testing, it appears that there is very limited LNAPL present as free product floating on the water table, but there is a larger volume of soil that is impacted by residual oil left behind as the oil plume migrated to the river, and smeared vertically as the water table rose and fell.

4.5.2 LNAPL Characterization

Teflon disc LNAPL results from monitoring wells MW-002, MW-005A, and MW-006 indicate the presence of No. 6 fuel oil, SVOCs, metals, and dioxin/furans within the LNAPL.

A sample of product was collected from monitoring well MW-012 on November 14, 2001 during the Technical Assistance Effort. Results indicate that the product is comprised of primarily No. 6 fuel oil. PCP was detected at a concentration of 19,000 mg/kg (or 1.9% by weight). PAH compounds commonly found in fuel oil/diesel, including acenaphthene (200 mg/kg), naphthalene (96J mg/kg), 2-methylnaphthalene (1,000 mg/kg), and phenanthrene (560 mg/kg), were also detected in the pure product sample.

VOCs detected in the pure product included acetone, methylcyclohexane, xylenes, and isopropylbenzene. Detected SVOCs include 1,1'-biphenyl, fluorene, and 2,3,5,6-tetrachlorophenol. Detected metals include aluminum (28J mg/kg), chromium (14.5 mg/kg), iron (12J mg/kg), mercury (0.03J mg/kg), and selenium (0.8J mg/kg).

4.6 Fish Tissue

Figure 4.6-1 shows a summary of contaminants of concern in fish samples. Table 4.6-1 shows the testing results. A comparison of upgradient and on-site fish samples indicates that contaminant concentrations in on-site sample are generally higher than upstream samples.

Testing results indicate that concentrations of PCP are higher in on-site pickerel and white sucker whole body samples than upstream samples. PCP was not detected above the quantitation limit of 390 ug/kg in upstream samples but was detected in both on-site pickerel and white sucker at 3,100 ug/kg and 7,400 ug/kg, respectively. PCP was not detected in crayfish samples.

Concentrations of metals (arsenic, cadmium, chromium, copper, and lead) are similar in on-site samples than in upstream samples.

The dioxin TEQ concentrations are higher in on-site crayfish samples compared to upstream samples. A 5.8 ng/kg dioxin TEQ (1998 TEQ) was observed in on-site crayfish sample RR-SITE-CRAY, while only a 0.094 ng/kg dioxin TEQ was observed in upstream sample RR-UP-CRAY. The dioxin TEQ concentrations are similar in on-site fish samples compared to upstream fish samples.

4.7 Background

4.7.1 Soil

Table 4.7-1 lists the maximum detected value for each contaminant that was present in the background soil samples (SS-051, SS-052, SS-054 and SS-057).

4.7.2 Ground Water

Table 4.7-2 lists the maximum detected value for each contaminant that was present in the upgradient ground water monitoring well (MW-11).

5.0 Contaminant Fate and Transport

Based on the known history of Site operations, observed contaminant distribution, chemical and physical properties of the contaminants at the Site, and Site hydrogeology, most of the contamination observed at the Site appears to be sourced by wood treatment operations and related releases of wood treatment chemicals. Similarly, based on the above data, the principal mechanisms for subsurface transport of the contaminants are identified as migration of free product (LNAPL) and migration with flowing ground water (i.e., dissolved in the aqueous phase). As ground water discharges to the Rumford River, associated contaminants both dissolved in ground water and LNAPL, also discharge to the stream where they are transported along with surface water and stream sediment. Overland flow of contaminants may also occur in the form of contaminated storm water and historically through spills of chemicals. A variety of attenuation mechanisms tend to retard the transport of contaminants, and reduce the overall mass of contaminants in the subsurface and surface environments.

This section begins with a general discussion of the factors affecting fate and transport, followed by a discussion of fate and transport mechanisms influencing specific groups of compounds detected on site. The following subsections present the chemical characteristics of contaminant source areas, transport mechanisms, contaminant fate, and impacted receptors.

5.1 Factors Affecting Fate and Transport

A number of physical, chemical, and biological processes are known to impact the fate and transport of environmental contaminants. In addition to the individual effects of each such process, there is much interaction between them. Interaction of one process may limit the impacts of another on the same target compound. The principal factors affecting environmental fate and transport of chemical contaminants are briefly described below.

5.1.1 Solubility

Solubility is the measure of a chemical's ability to dissolve in water and is expressed in units of chemical mass/unit volume of water (e.g., ug/L or mg/L). Aqueous solubility is an important determinant of chemical concentration and residence time in water. Highly soluble chemicals dissolve readily in water and remain in solution. In addition, highly soluble compounds are less likely to volatilize from water and are more likely to biodegrade. Chemicals exhibiting low solubility tend not to remain in solution due to adsorption and/or precipitation. In regards to the impact upon contaminant transport, solubility will directly affect the rate of leaching of chemicals from contaminated wastes or soils.

5.1.2 Volatilization

Volatilization describes the movement of a chemical from the surface of a liquid or solid matrix to a gas or vapor phase. Only the neutral (uncharged) form of a compound can volatilize. Volatilization rates are affected by soil properties, vapor pressure, temperature, and sorption. VOCs partition between the aqueous and gaseous phase in unsaturated soils. This process will occur most readily for compounds with a high vapor pressure and a high Henry's Law Constant Value (H). Volatilization is a particularly important environmental fate and/or transport process for chemicals exhibiting low aqueous solubility and polarity.

VOCs in the saturated zone or in surface water will partition to the gaseous phase, particularly those with lower solubility (e.g., xylenes). VOCs with greater aqueous solubility (e.g., benzene) show a relatively greater tendency to remain in solution. Note that the effectiveness of volatilization normally decreases with depth in the soil column.

Volatility of a compound increases with increasing vapor pressure. Lyman et al., (1982) describes compounds as "readily," "significantly," or "limitedly" volatilized based on the values of their Henry's Law Constants. For example, compounds with H values less than 1.0×10^{-5} (e.g., dimethyl phthalate pyrene) have a low degree of volatility, and those with H values below 3.0×10^{-7} are considered non-volatile (PCBs). H values between 1.0×10^{-5} and 1.0×10^{-3} (e.g., naphthalene and phenanthrene) are moderately volatile, while those with values exceeding 1.0×10^{-3} (e.g., VOCs) are considered highly volatile.

5.1.3 Sorption

Sorption (adsorption/absorption) is usually defined as the reversible binding of a chemical to a solid matrix. However, there is evidence in the published literature that there is a partially irreversible component related to the time that the compound has been sorbed. Both soluble nonpolar and insoluble chemicals may sorb strongly to sediments, suspended soils, and soils. Sorption of these compounds limits the fraction available for other fate processes such as volatilization and/or hydrolysis.

Partition coefficients, which are measures of sorptive characteristics, define the relative concentrations of a given chemical in two phases or matrices. The tendency of organic chemicals to be sorbed is also dependant on the organic content of the soil and the degree of hydrophobicity (lack of affinity for water) of the solute (contaminant).

The rate of travel for each chemical depends on the ground water seepage velocity and the degree of sorption. If an organic chemical is extensively adsorbed by particles, it will be rendered relatively immobile. The rates and degree of volatilization, photolysis, hydrolysis, and biodegradation are directly dependant on the extent of adsorption. The vadose zone typically contains greater amounts of organic material and metal oxides (which may also act as sorbents) than the saturated zone, which may make the rate of movement in the vadose zone substantially less than that in the saturated zone (USEPA, 1989a).

Partition coefficients are expressed as concentration ratios between two phases. Partition coefficients useful in describing the environmental behavior of chemical contaminants include K_{ow} K_d and K_{oc}, and are defined below.

- **K_{ow}** (Octanol-water partition coefficient): the ratio of the chemical concentration in octanol (organic solvent) to that in water, at steady state conditions. The octanol serves as a surrogate for lipid or other organic phases.

- **K_d** (Distribution Coefficient): the K_d parameter is important in estimating the potential for the adsorption of dissolved contaminants in contact with soil. As typically used in fate and contaminant transport calculations, the K_d is defined as the ratio of the contaminant concentration associated with the solid to the contaminant concentration in the surrounding aqueous solution when the system is at equilibrium.

For example, the most conservative estimate of contaminant migration through the subsurface natural soil is to assume that the soil has little or no ability to slow (retard) contaminant movement (i.e., a minimum bounding K_d value). Consequently, the contaminant would migrate in the direction and, for a K_d value of ≈ 0, travel at the rate of water. To estimate the maximum risks (and costs) associated with onsite remediation options, the bounding K_d value for a contaminant will be a maximum value (i.e., maximum retardation).

The K_d value is usually a measured parameter that is obtained from laboratory experiments. Ideally, site-specific K_d values would be available for the range of aqueous and geological conditions in the system to be modeled. Values for K_d not only vary greatly between contaminants, but also vary as a function of aqueous and solid phase chemistry.

- **K_{oc}** (Organic carbon-water partition coefficient): the K_d normalized to the concentration of organic carbon in the solid phase. High K_{oc} values usually indicate a high tendency of a compound to sorb to the organic soil matter. Chemicals with a K_{oc} greater than 10,000 will adsorb strongly to soil organic carbon (e.g., fluoranthene, phenanthrene, and pyrene). Chemicals with a K_{oc} ranging from 1,000 to 10,000 will moderately adsorb, and move slowly in the soil profile (e.g., naphthalene). Chemicals with a K_{oc} of less than 1,000 weakly adsorb to soil organic carbon and tend to be more mobile. Examples of weakly adsorbed compounds include many VOCs such as benzene and xylene.

5.1.4 Hydrolysis

Hydrolysis refers to the chemical breakdown reaction involving the water hydrogen ions (H^+) and hydroxyl radicals (OH) associated with water. The result of hydrolytic reaction is the subsequent breakdown and/or modification of the compound. The extent of chemical hydrolytic reactivity depends upon both pH (acidity/alkalinity) and the molecular structure of the specific target chemical.

5.1.5 Photolysis

Photolysis refers to the decomposition process induced by radiant energy (sunlight) on target compounds. Specifically, photochemical breakdown processes involve structural changes in a molecule induced by radiation in the ultraviolet-visible light range. The rate of decomposition of a chemical from photochemical reactions depends on its molecular structure, the proximity and character of the light source, and the presence of other reactant compounds. This process may occur in surficial soils, but would not affect contamination in the subsurface soils.

5.1.6 Oxidation/Reduction

Oxidation/reduction are chemical reaction processes that involve the removal or addition of electrons from, or to, a target compound. Both oxidation and reduction reactions are environmentally significant in that they influence the mobility and fate of chemicals in environmental matrices. Oxidized and reduced forms of the same chemical compound may exhibit entirely different chemical, ecological and/or toxicological properties.

In general, substituted aromatic compounds such as ethylbenzene and naphthalene can be oxidized. Oxidation rates for aromatic compounds are typically an order of magnitude faster than for chlorinated aliphatic compounds (e.g., 1,2-dichloroethane [1,2-DCA]). Overall, abiotic (without biological life) oxidation of organic compounds in ground water systems is limited.

5.1.7 Bioaccumulation

Bioaccumulation refers to the accumulation and transport of chemical compounds by living organisms resulting from tissue absorption levels exceeding the chemical that is ingested that may be further concentrated through the food chain. Potential for bioaccumulation is quantified by bioconcentration factors (BCFs), which define the ratio of the concentration of a compound in animal or plant tissue to that found in the immediately-surrounding environment (ambient air, water or soil). BCFs generally tend to underestimate the potential contaminant concentration in the organism. Organic chemicals with high BCFs (such as pesticides) are typically insoluble in water and lipophilic (attracted to liquids) and, thus, tend to remain in animal fat tissue. Some heavy metals, such as mercury, may also be bioaccumulated. BCF values presented in the literature most commonly pertain to fish species.

5.1.8 Biotransformation/Biodegradation

Biotransformation/biodegradation refers to the biologic conversion of chemical compounds to other products. Many microorganisms and biota are resistant to, or develop resistance, to specific chemicals (particularly organic chemicals) and can metabolically transform those compounds to products that may or may not be as toxic as the original compounds. Biological transformation includes a variety of enzyme-catalyzed reactions such as oxidation and reduction. Variables affecting the rate of biodegradation include the following.

- Number of microorganisms
- Chemical properties, concentrations, and distribution
- Presence of food and nutrients
- Temperature
- pH
- Moisture and oxygen content

The rate of biodegradation tends to be higher for low molecular weight compounds. Naturally occurring soil and aquatic microorganisms capable of degrading aromatic hydrocarbons (e.g., BTEX) have been studied, and a relationship between dissolved oxygen and biodegradation has been documented (Jamison, et al., 1975; and Bailey, et al., 1973). As the aromatic hydrocarbons are mobilized by dissolution from soil or sediment, they are likely to be rapidly degraded as long as microorganisms and dissolved oxygen are available. Degradation rates for aromatic hydrocarbons are much slower under anaerobic conditions.

5.2 Fate and Transport Properties of Contaminants of Concern

This section summarizes the chemical characteristics and expected environmental fate and transport behavior of chemicals of concern associated with the Hatheway and Patterson Superfund Site. The organic constituents of concern are grouped into seven general classes; these are halogenated VOCs, non-halogenated VOCs, acid extractable SVOCs, base-neutral SVOCs, pesticides, PCBs/dioxins, and inorganics. Inorganics of interest consist of metals and cyanide. Sources of these site contaminants, and a brief account of their presence at the Site, are discussed. A summary of anticipated fate and transport mechanisms affecting each chemical class is presented in Table 5.2-1.

5.2.1 Halogenated VOCs

Relatively low concentrations of halogenated VOCs including dichlorodifluoromethane, vinyl chloride, bromomethane, chloroethane, 1,1-dichloroethene, trans-1,2-dichloroethene, 1,1-dichloroethane, cis-1,2-dichloroethene, 1,1,1-trichloroethane, trichloroethene, and 1,2-dichloroethane were detected in ground water and surface water. In general, halogenated volatile organics are widely used as solvents, degreasers, dry-cleaning agents, refrigerants, and chemical intermediates. Due to their widespread use in many industrial settings, chlorinated solvents are often found in the environment, originating from numerous point and non-point sources.

5.2.2 Non-Halogenated VOCs

Moderate concentrations of several non-halogenated VOCs, including ethylbenzene, xylenes, and toluene were detected in on-site media. The non-halogenated volatiles detected during the site investigation may have originated from several sources. Some of the non-halogenated compounds detected at the site are components of fuel oil, which was used on-site for heating and for use in the wood treatment processes.

Non-halogenated VOCs tend to be highly volatile and therefore are readily transported into the atmosphere from surficial soil and water matrices. Vapor pressures range from 5.0 mm Hg for styrene to 297 mm Hg for carbon disulfide. As a result, volatilization of these compounds from near-surface sources is expected to be an environmental fate process at this site; however, the number of non-halogenated VOCs detected in surface soils and the concentration detected are both small.

5.2.3 Acid SVOCs

Moderate to high concentrations of acid SVOCs, primarily PCP, were detected in on-site media. Other examples of acid SVOCs detected on site include 2-methylphenol; 4-methylphenol; 2,4-dimethylphenol; 2,4-dichlorophenol; 2,4,5-trichlorophenol; 2,4,6-trichlorophenol; 4,6-dinitro-2-methylphenol; 2,3,5,6-tetrachlorophenol; and 3,4-dimethylphenol. These compounds originated from the on-site use of PCP solutions.

Since these compounds were released as constituents of oil, the primary transport mechanism is through flow of the LNAPL underground. The LNAPL mass acts as a secondary source of contamination for release of contaminants to ground water that is traveling in the saturated zone.

Biodegradation by microbial populations is a significant environmental fate process for some of the acid SVOCs associated with the Site. These compounds may biodegrade relatively rapidly under a wide range of conditions. The majority of acid SVOCs associated with the Site are not expected to be persistent. Although the phenolic compounds detected onsite are water-soluble and, therefore, can be mobilized into surface and ground waters, they are not persistent in these environments due to their moderate volatility, susceptibility to microbial degradation, and variable affinity for organic matter and clays.

5.2.4 Base-Neutral SVOCs

A number of base-neutral SVOC compounds were identified during the investigation. The two primary subgroups of base-neutrals detected onsite are PAHs and phthalate esters. The focus of this discussion will be on PAHs as they were detected more frequently and at higher concentrations than phthalate esters.

The PAHs associated with the Site exhibit varying degrees of binding affinity to organic matter and soil particulates; this affinity is dependant upon their individual molecular structures. In general, the higher molecular weight PAHs are strongly adsorbed whereas the lighter PAHs (e.g., naphthalene) are less strongly sorbed (USEPA, 1979, USEPA, 1986). Therefore, adsorption to organic matter and/or soil particulates is expected to be an important environmental fate process, particularly for the higher molecular weight PAHs.

Bioaccumulation is usually a transitory process since most PAHs with less than five rings are readily metabolized by higher organisms (USEPA, 1979). The detection of PAHs in aqueous matrices (e.g., ground water and surface water) and sediment suggests that bioaccumulation is likely to be a mechanism for environmental fate of PAHs.

5.2.5 Pesticides

Pesticides were detected in a number of surface water and sediment samples. A total of 12 pesticides were detected, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Aldrin, alpha-Chlordane, Dieldrin, Endosulfan II, Endosulfan sulfate, Endrin, gamma-BHC (Lindane), gamma-Chlordane, and Methoxychlor.

The presence of these compounds demonstrates the persistence of some pesticides in the environment. DDT, for example, has been banned for a number of years; its presence indicates the likelihood that it can persist. Concentrations of these pesticide residues onsite are limited.

Presence of these compounds is most likely due to the previous application on or adjacent to the Site and transport from off-site sources. The chlorinated pesticides detected are highly persistent chemicals that strongly adsorb to soils and organic matter. Sorption appears to be the dominant environmental process affecting the fate of pesticides. Water solubility of the chlorinated pesticides is variable due to the presence of functional radicals, polarity of the molecules and molecular structure. In theory, surface runoff and ground water may provide transport mechanisms for soluble compounds such as gamma-BHC, but not less-soluble compounds such as DDT (except as a sorbed component of transported soil particles).

Photolysis, hydrolysis, oxidation, and biodegradation are not likely to be major factors in determining the fate of these compounds, although all are expected to have some impact. Bioaccumulation can be significant for certain chlorinated pesticides, such as DDT, however due to the low concentrations detected and their low solubility, potential impacts from this biologic process are expected to be limited.

5.2.6 PCBs/Dioxin

Dioxins were detected in all media and are most concentrated in surface soil and shallow subsurface soil in the Operations Area. Two PCB Aroclors (Aroclor 1254 and Aroclor 1260) were detected in a limited number of sediment samples collected from the Rumford River. No other evidence of PCBs was identified in environmental media during the investigation.

PCBs are generally associated with industrial applications in electrical equipment, particularly electrical transformers. Until the late 1970s, PCB oils were commonly used as fire-resistant dielectric fluids in high voltage transformers. As a result of their widespread use, PCBs were commonly released to the environment due to incidental spillage, contamination of maintenance equipment, etc. The presence of PCBs may also be associated with hydraulic equipment and lubricants. Their presence at the site may be due to any or all of these potential uses. However, the detection of PCBs upstream of the site suggests the existence of other sources unrelated to the site.

Dioxins were not specifically used in the wood treatment process but are common chemical contaminants in commercially supplied raw material. Due to their persistent nature, they have accumulated in the Site soils and sediment.

Adsorption to soils/sediments or organic matter is a major process controlling the environmental fate of PCBs and dioxins. Like chlorinated pesticides, high affinity for adsorption to organic matter is evident from their high partition coefficients. Water solubility and partition coefficients among different PCBs are correlated with the number of chlorine atoms on the molecule. [Consequently, PCB congeners with low numbers of chlorine atoms tend to sorb less strongly than the more heavily chlorinated molecules, such as Aroclor 1254.] The strong adsorptive tendencies of both PCBs and dioxins suggest that these compounds will remain bound to sediment.

PCBs and dioxins have been shown to bioaccumulate in the adipose tissues of animal species.

5.2.7 Inorganics/Metals

A large number of inorganic compounds were detected in environmental media samples; these include 23 metals and cyanide. Many of the metals encountered are normal constituents of natural soils or common dissolved constituents in associated aqueous matrices resulting from soil leaching (e.g., aluminum). However, a number of those metals identified were detected in concentrations in excess of those generally seen in naturally occurring soils/water. Heavy metals, which are significant due to their well-characterized potential human and environmental toxicities, were also detected in site soil and water samples and at concentrations above screening criteria.

In general, many of the metals detected in site samples are typically persistent in the environment. This persistence is related primarily to recycling mechanisms (e.g., for arsenic, lead and copper), and removal mechanisms (e.g., precipitation, cationic exchange, adsorption, etc.) that decrease mobility and, therefore, transport. Degradation does not occur for the majority of these materials due to their elemental (or ionized) state. High solubility of some metal-based salts facilitates their migration in surface or ground waters. Overall, however, elevated heavy metal contaminant contributions at the Site are primarily associated with soil in the Operations Area.

Cyanide was also detected in surface water. Cyanide mobility in the environment is a function of solubility and pH of the water in which it may dissolve (EPRI, 1991). Cyanide forms a variety of complex species of variable stability; their dissociation is a function of pH. Complexes break down under mildly acidic conditions and cobalt cyanides require very acidic ($pH < 2$) conditions. As with most cyanides, the solubility increases with pH. A major dissolution effect results at pHs between 8 and 9; pH below 7 has little effect on solubility.

5.3 Summary of Chemical Characteristics of Contaminant Source Areas

This subsection provides a summary discussion of the chemical characteristics of the principal on-Site contaminant source areas drawn from the contaminant distribution data presented in Section 4.0. This discussion is not intended to be exhaustive, but rather to provide an overview of the key general chemical characteristics of the principal contaminants (e.g., SVOCs, arsenic, lead, dioxin), in particular as they relate to potential sourcing of ground water contamination. In the discussion of these areas, it should be noted that their identification and characterization are limited to available Site data, that source areas tend to overlap or be obscured by more upgradient sources, and the chemical composition and contaminant mass of source areas may change with time due to Site usage (e.g., introduction or removal of contaminants) or as contaminants attenuate at the sources.

The discussion of each source area includes a generalized description of the relative degree of contamination of various media relative to: 1) other identified source areas and/or; 2) conditions upgradient or hydrologically isolated from the subject area, and/or; 3) applicable regulatory standards or risk-based screening levels. This discussion is intended to provide an overview of the potential relative significance of the source areas, particularly in terms of ground water contamination.

5.3.1 Operations Area

The Operations Area is located northeast of the railroad tracks and south of the Rumford River. Based on the wood treatment processes that were carried out at the Site, and contaminant profiles from other wood treatment sites, the principal contaminants of concern include copper, chromium, arsenic, PCP, and dioxin. These contaminants were stored in the Operations Area and may have leaked from their storage area/vessel. These contaminants were then applied to the wood and again, fugitive contaminants have the potential to be released through leaks in the building foundations and underdrain systems. Lastly, the treated wood was placed on "drip racks" where the treatment solution containing contaminants would drain off to the ground surface, where it may or may not have been protected by concrete or some other covering.

Based on surface and subsurface testing conducted at the Site, the two primary contaminant sources in the Operations Area are the Cylinder No. 1 and 2 Building and the Cylinder No. 3 Building.

- The Cylinder No.1 and 2 Building is where PCP solutions in fuel oil/creosote were applied to wood products. Apparent entry points for contaminant into the environment include several PCP sumps inside the building and the PCP drip pad located to the west of the building. The highest on-site concentrations of PCP and dioxin in both surface and shallow subsurface soil were detected in the vicinity of the Cylinder No. 1 and 2 Building and PCP drip pad. The highest concentrations of arsenic in deeper subsurface soil (4 feet and below) were detected in this area. Also, elevated concentrations of PCP and dioxin in deeper subsurface soil (4 feet and below) were detected in the vicinity of the Cylinder No. 1 and 2 Building.

- The Cylinder No. 3 Building is where CCA salt solutions were applied to wood products. Apparent entry points for contaminants into the environment include a sump located inside the Cylinder No. 3 Building and the CCA drip pad. The highest concentrations of arsenic in surface and shallow subsurface soil were detected in the vicinity of this the Cylinder No. 3 Building and CCA drip pad. Elevated concentrations of dioxin in deeper subsurface soil (4 feet and below) were also detected in this area.

Typically, these contaminants do not migrate beyond the upper few feet of the soil or beyond the immediate area of the release. However, the inorganics can migrate further via leaching from infiltrating rain water depending upon site specific pH and Eh conditions. Data from the Site suggest that migration of arsenic from soil into ground water has occurred at this site. The PCP and dioxin are not very soluble and have high affinities for sorption to an organic soil matrix, but these contaminants may also be spread further from the release area through migration of the carrier liquid, which is typically fuel oil or creosote. Testing results indicate that PCP has migrated in the direction of ground water flow. Lastly, the carrier liquids may be released as LNAPL in the Operations Area. Based on previous site testing, LNAPL releases have occurred, and appear to have emanated from the Operations Area.

5.3.2 Wood Drying Areas

Most of the cleared areas of the Site were at one time used for drying or storage of treated wood, based on historical aerial photographs. The same contaminants of concern are known to be present in the wood drying areas, though lower concentrations would be expected since the chemicals were probably not stored or applied in these areas. Since no carrier liquids were likely present in the drying areas, other than minor amounts adhered to the wood, LNAPL releases are also unlikely in the drying areas. However, at this site, NAPL releases from the Operations Area may have migrated beneath the drying area south of the railroad tracks.

5.3.3 LNAPL Accumulation Area

Based on free product measurements taken during the Technical Assistance Effort, RI ground water sampling rounds and the CPT investigation, the area bound to the north by the Rumford River, bound to the east by the railroad tracks and bedrock outcrop, and bound to the west and south by the low-lying wetland area is observed to contain oil in the vadose zone soils. The highest concentrations of PCP and dioxin in subsurface soil (4 feet and below) were detected in this area. As discussed in the following sections, both PCP and dioxin may have migrated with the LNAPL, which has appeared to settle into this area and have become a source for dissolved ground water contamination.

Historic data indicate that a much larger plume of LNAPL has migrated through this area. The isolated pockets of free product and LNAPL-saturated subsurface soils that remain underground appear to be residual oil remaining from the historic plume. LNAPL has surfaced at two locations on site (see Figure 4.5-2). The first location was along the Rumford River southern bank, and the second area was in the low-lying wetland area south of MW-012. Because of the observed seep into the river, an interceptor trench was constructed and, reportedly, over 2,500 gallons of oil was recovered through the ground water pumping operations by 1982. Gravel was placed over the wetland seep to limit direct contact.

5.4 Migration Pathways

5.4.1 Free Product Contaminant Transport and Fate

Much of the observed Site contamination likely initially entered the subsurface in the form of free product, which is sparingly soluble to essentially insoluble in water. As is commonly observed at the Site, petroleum liquids in their free product form are less dense than water. LNAPL has been observed, typically in relatively substantial quantities, downgradient of the source areas discussed in Section 5.3.

Once NAPL has entered the subsurface, it migrates downward generally under the influence of gravity and subordinate capillary forces. As NAPL flows in a generally downward direction, these capillary forces will tend to retain a certain portion (residual) of the NAPL within the soil. If sufficient NAPL mass is present, it will continue to flow downward until it encounters the capillary fringe above the ground water table.

At this point, additional NAPL accumulation will tend to spread out laterally provided there is sufficient mass. LNAPL will tend to depress the water capillary fringe and migrate in the downgradient direction with minimal penetration due to buoyancy.

NAPL will tend to continue to migrate as long as a gradient exists, and NAPL is present in amounts exceeding the residual saturation. In this mobile form, NAPL is "free product." The direction of NAPL migration is strongly affected by characteristics of the geologic media; even relatively subtle permeability changes can significantly affect the direction and/or rate of NAPL migration. Once NAPL is at residual saturation it will tend to cease migrating. Residual NAPL will exist within both the unsaturated and saturated zone through which the NAPL free product phase migrated. Fluctuations in the water table can act to "smear," in the vicinity of the water table, and thereby increase the vertical zone of residual NAPL.

Once present in the subsurface, physical-chemical reactions will act to attenuate NAPL contamination. Volatilization will tend to remove NAPL components with a high vapor pressure present above the water table. Dissolution and transport in the aqueous phase will reduce the mass of water soluble components of NAPL. Biodegradation is also a potentially significant attenuation mechanism for petroleum hydrocarbon (PHC)-dominated LNAPL.

LNAPL at the Site is composed largely of PHCs (fuel oil, creosote), SVOCs, and metals as lesser to minor constituents. Existing data indicate that LNAPL migration is the principal subsurface transport mechanism for SVOCs (primarily PCP), metals, and dioxin. The correlation of elevated concentrations of these compounds with ground water samples from monitoring wells which contain free product or are in the smear zone are further evidence that LNAPL migration is the major subsurface transport mechanism.

5.4.1.1 LNAPL Migration

Free product appears to have expanded/migrated from the apparent source in the Operations Area in a generally southwest direction which is generally consistent with overburden ground water flow. Historically, the free product body appears to have migrated to points of surface discharge at a location along the Rumford River in the vicinity of interceptor trench and at a seep area south of monitoring wells RCA-07 and MW-012.

Site observations and data collected during RI investigations indicate that the free product rate of movement, which is dependent on the viscosity of the oil, permeability of the soil, degree of oil saturation, and the oil-air gradient, is relatively slow.

5.4.1.2 Attenuation Mechanisms

Potential attenuation mechanisms for the free product are varied, depending on the particular chemical constituent of concern. The PHCs which comprise the bulk of the LNAPL present at the Site are typically relatively non-volatile, and insoluble in water. Generally, only the lowest molecular weight compounds within the PHCs, the lighter fraction of fuel oils, would tend to be significantly attenuated by volatilization in the subsurface.

Biodegradation is likely the most significant natural attenuation mechanism for the bulk of the PHCs that constitute the observed LNAPL. Numerous studies have demonstrated that PHCs are, in general, biodegradable and that this natural biodegradation can be enhanced with the addition of nutrients and/or oxygen. In general, PHC biodegradation reactions are oxidation-reduction (redox) reactions, involving the transfer of electrons from the organic contaminant compound to an electron acceptor (i.e., oxidation of the organic contaminant). Oxygen is the electron acceptor for aerobic metabolism, whereas nitrate, ferric (III) iron, sulfate and carbon dioxide serve as electron acceptors for alternative anaerobic pathways.

The potential effects of adsorption of organic compounds from the free product onto soil are not easily quantified, due to the lack of information on the degree of partitioning of organic compounds from the free product onto organic carbon (or other components) in the soil. However, based on the relatively low organic carbon content of the soil and the inherently carbon-rich nature of the LNAPL, such adsorption typically is not considered to be a significant attenuation mechanism.

5.4.2 Contaminant Transport and Fate in Ground Water

Migration as a dissolved constituent in ground water is generally not considered to be an important mass transport mechanism (i.e., compared to LNAPL migration) for SVOCs (other than the lighter PAHs), metals, and dioxin.

5.4.2.1 Aqueous Phase Transport and Fate - General Discussion

Infiltrating precipitation encounters and dissolves contaminants in the vadose zone during downward travel to the water table. Phreatic ground water dissolves contaminants at the water table and below, including those within free product LNAPL. Dissolved constituents will migrate with flowing ground water by the process of advection at a velocity equal to or less than the velocity of the ground water. Numerous attenuation mechanisms affect dissolved contaminants and tend to decrease their migration rates, concentrations, and overall mass. These natural attenuation mechanisms include hydrodynamic dispersion, dilution, adsorption, volatilization and biodegradation.

Hydrodynamic dispersion, which occurs as contaminants are transported through a porous medium includes both molecular diffusion and mechanical dispersion. Molecular diffusion is the transport of ionic and molecular species (e.g., contaminants) from areas of higher concentrations to areas of lower concentrations driven by concentration gradient. Mechanical dispersion describes the spreading of the contaminant mass as a result of pore-scale effects and macrodispersion (i.e., aquifer heterogeneity). Hydrodynamic dispersion predominantly reflects mechanical dispersion under conditions similar to those at the Site where there is appreciable advective ground water flow. Other factors that may contribute to the spreading of the contaminant mass at the Site such as transient shifts in the ambient ground water flow direction and the influence of residential pumping wells are often accounted for in hydrodynamic dispersion as macrodispersion effects similar to aquifer heterogeneity. Such macrodispersion effects can also be significant for fractured bedrock units.

Transport by hydrodynamic dispersion is typically relatively minor compared to transport by advection in moderately to highly permeable sandy units such as those which underlie the Site; however, dispersion may account for some spreading of contaminated ground water in directions other than directly downgradient of a contaminant source area. Dispersion will tend to lower contaminant concentrations but not overall contaminant mass. Similar to hydrodynamic dispersion, dilution from natural recharge results in a decrease in contaminant concentration due to mixing with clean water as contaminants migrate downgradient. Contaminant plumes that are deeper in the aquifer are less susceptible to attenuation by dilution.

The mechanism of adsorption tends to slow or retard the advective velocity at which organic constituents migrate. The amount of retardation for organic compounds can be estimated using the following equation (Fetter, 1988):

$$R = \frac{V}{V_C} = 1 + \frac{\rho_b \, K_{OC} \, f_{OC}}{n_W}$$

Where:

R = retardation factor;
V = average horizontal ground water seepage velocity (ft/day)
V_C = advective contaminant migration velocity (ft/day);
ρ_b = bulk density of soil (g/cm^1);
K_{oc} = organic carbon-water partition coefficient;
f_{OC} = fraction of organic carbon in soil; and
n_W = fraction water-filled porosity.

Assumed typical values are:

V = 0.17 to 0.33 ft/day;
ρ_b = 1.8 grams per cubic centimeter (g/cm3);
K_{oc} = varies with the compound of concern.
f_{OC} = 0.55 x 10^{-3} to 23.1 x 10^{-3}; and
n_W = 0.2 to 0.3.

The range in values presented above for f_{OC} is based on two methods of estimation, direct chemical analysis of soil samples for TOC; and calculation of "effective" f_{OC} based on the presence of contaminants in ground water from downgradient monitoring wells. As indicated in Section 3.2.2.1, TOC in subsurface soil ranges from 549 mg/kg to 23,100 mg/kg.

Although volatilization is a significant attenuation mechanism for VOCs, lighter PAHs and other relatively volatile constituents in NAPL form above the water table, once in the aqueous phase below the water table, volatilization is limited by diffusion through ground water to the vadose zone. The contaminant flux which can be potentially transferred by this upward diffusion through ground water is typically less than the overall contaminant flux within the ground water. Hence, volatilization is generally not considered to be a significant attenuation mechanism for dissolved constituents in ground water at depths appreciably below the water table.

Biodegradation (or biological transformation) is a potentially significant factor in aqueous phase contaminant attenuation. Biodegradation at the Site has likely affected the dissolved fuel hydrocarbons. The rates and by-products of biodegradation can be highly variable depending on the nature of the contaminants present, the species of microorganisms, availability of nutrients, and general ground water chemistry.

5.4.2.2 Transport and Fate in the Aqueous Phase at the Site

Figures 4.2-1 shows the distribution of contaminants in ground water (i.e., contaminated ground water plume) indicating a migration pathway that is consistent with the inferred direction of ground water flow in the area. This plume has been delineated based on the identified contaminant sources and their chemical and physical characteristics, the interpreted ground water flow directions, and the observed distribution of contaminants in ground water.

From the apparent source area, the plume migrates primarily to the southwest and somewhat less to the south. The plume appears to diverge at the bedrock outcrop. The easternmost portion of this plume appears to discharge to the Rumford River in the vicinity of the interceptor trench, and the southernmost portion of the plume appears to weaken towards the southern Site boundary evidenced by decreased contaminant concentrations in monitoring well MW-008A and RCA-08.

Based on the distribution of PCP in the overburden and bedrock, the southeastern portion of this plume appears to migrate to deeper levels of the overburden and enter the bedrock water bearing zone. The bedrock elevation rises south of the railroad tracks in the path of the PCP plume and there is a large area of unsaturated overburden. It appears that as contaminated ground water enters the bedrock at this point, slight downward hydraulic gradients that exist in this area allow the contaminants to migrate into the bedrock water bearing zone. No PCP is observed in the bedrock aquifer on the upgradient side of the bedrock outcrop, and downgradient of the bedrock outcrop, the bedrock water bearing zone contains elevated PCP concentration that mirror the distribution pattern in the overburden. It appears that as the bedrock elevation deepens further to the southwest in the direction of ground water flow, a portion of the plume re-enters the overburden water bearing unit and a portion remains in bedrock.

Contaminants in the bedrock water bearing unit are present at much lower concentrations due to the lack of a secondary source that is present in the overburden (LNAPL and residual LNAPL). Due to dilution, dispersion and possibly biodegradation, the bedrock plume is attenuated prior to leaving the site.

5.4.3 Contaminant Transport and Fate in Surface Water and Sediment

Site contaminants appear to have entered the Rumford River surface water and sediment largely, if not essentially entirely, through discharge of Site ground water and floating free product into the stream and adjacent wetlands. As discussed in previous sections, the principal discharge zone for free product appears to be at the location of the formerly used interceptor trench.

Once the contaminants enter the surface environment, they will tend to be transported and dispersed with surface water and sediment, and may be incorporated into biomass, which may result in changes in the chemical state of the contaminants. Organic contaminants will tend to be degraded by biological activity, and abiotic processes including photolysis. VOCs will tend to volatilize into the atmosphere.

The following subsections discuss the transport and fate of contaminants in this surface environment. In general, this discussion of apparent contaminant sources summarizes data and discussions presented previously. The discussion presented below is not intended to be exhaustive, but rather to provide an overview of the apparent sources of observed contamination which appear most significant. The discussion of transport and fate of contaminants is general in nature. The reader is referred to Section 6.0 summarizing the Risk Assessments, and the Risk Assessment reports submitted under separate cover, for additional discussion of contaminant transport and fate in Site surface water and sediment.

5.4.3.1 Contaminant Sources for Surface Water and Sediment

As indicated above, based on available data, contaminant sources both from on-Site and off-Site appear to have contributed to the contaminants observed in surface water and sediment. The discussion of contaminant sources will follow the apparent sources and their apparent impact on surface water and sediment from upstream to downstream, including locations which are upstream (i.e., background) to the Site.

5.4.3.2 Comparison to Background Samples

Given the small number of background samples analyzed, and their relatively arbitrary locations, the contaminant concentrations detected in these samples are not considered to necessarily reflect the full range in concentrations present under background conditions, but rather to be an indication of the general range in concentrations to be expected in the absence of Site-sourced contaminants.

VOCs: Four VOCs (acetone, carbon disulfide, toluene, and xylenes) were detected above sediment screening criteria in on-site sediment samples.

- Neither acetone nor carbon disulfide was detected in upstream sediment samples. When detected in on-site samples, these compounds were also detected in the corresponding equipment blanks, indicating that the source of these compounds may not be representative of actual concentrations in sediment.
- Toluene concentrations in upstream sediment samples range from ND to 39 ug/kg (SD-018), while on-site concentrations range from ND to 100J ug/kg (SD-013).
- Xylene concentrations in upstream samples range from ND to 230EB ug/kg (SD-018), while on-site concentrations range from ND to 370 ug/kg (SD-009).

SVOCs: PAHs and several other SVOCs (PCP, 2-methylphenol, dibenzofuran, and diethylphthalate) were detected in on-site sediment samples above sediment screening criteria.

- In general, PAH concentrations detected in on-site sediment samples are on the same order as PAH concentrations detected in upstream sediment samples.
- PCP, a known site contaminant, was not detected in upstream sediment samples, but was detected in many on-site samples.
- 2-Methylphenol was detected in both upstream and on-site sediment samples. When detected in on-site samples, this compound was also detected in the corresponding equipment blanks, indicating that the results may not be representative of actual concentrations in sediment.
- Dibenzofuran concentrations in upstream sediment samples range from ND to 1,900 ug/kg (SD-018), while on-site river sediment concentrations range from ND to 280J ug/kg (SD-014). It should be noted that the highest on-site concentration of dibenzofuran in sediment was detected in vernal pool sample VP-002 at 440J μg/kg. However, this compound was eliminated as a contaminant of concern in the vernal pool SLERA because it did not exceed its sediment benchmark.
- Diethylphthalate (DEP) was detected at relatively low concentrations in both upstream and on-site sediment samples. It was also detected in vernal pool sample VP-001 at

3,300 μg/kg. DEP was dropped as a COC in the vernal pool SLERA, even though this concentration exceeded the sediment benchmark for this compound (i.e., 630 μg/kg). The reason was that DEP was also detected in the corresponding equipment blank, which cast doubt on the validity of the chemical analysis result. The presence of phthalates in blanks is a common occurrence because this class of compounds is used as plasticizers in plastic sample containers and laboratory equipment associated with analytical machinery (e.g., plastic tubing).

Metals: Eleven metals (arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, and zinc) were detected in on-site sediment samples at concentrations exceeding sediment screening criteria.

- Arsenic, chromium, and copper are known on-site contaminants. All three metals were detected in both upstream and on-site sediment samples. Concentrations of these metals in on-site samples were slightly higher than upstream samples.
- In general, the other metals detected in on-site sediment samples exceeding screening criteria were detected on the same order in upstream sediment samples.

Pesticides and PCBs: Based on the sediment testing data, exceedances of pesticides in sediment appear to be limited to upstream areas along County Street (locations RRUS-S, SD-012, SD-013 and SD-014) and in the vicinity of backwash channel branch at sample locations SD-003, SD-007, SD-008, SD-009, and SD-026, indicating that upstream sources have contributed to pesticide and PCB deposition in sediment.

Dioxin: Dioxin is a known site contaminant. Although dioxin was detected in upstream sediment samples, concentrations in on-site samples are generally higher.

5.4.3.3 Transport and Fate in Surface Water and Sediment at the Site

In general, the highest concentrations of apparently Site-related contaminants detected by this and previous investigations in surface water and sediment are from samples collected in the on-site reach of the Rumford River between SD-012 and SD-007 (see map 2.8-1), and in Vernal Pool C2 (location VP-002—see Map 2.8-1). The Site-related contaminants detected in the Rumford River likely reflect the effects of surface drainage and historic discharging of free product in the vicinity of the former interceptor trench. The Site-related contaminants detected in Vernal Pool C2 appear to be due largely to contaminated ground water discharge in this area based on the elevated PCP present in nearby wells MW-010 (PCP=1,800 ppb) and MW-G (PCP=2,600 ppb).

Metals, which by their nature as chemical elements are not degradable, and are typically relatively insoluble and non-volatile, were detected at elevated levels (i.e., relative to background and screening levels) in sediments as far downstream as Fulton Pond (sample location SD-024). One upstream (SD-027), one downstream (SD-015), and three on-site sediment samples (SD-009, SD-011, and SD-026) were analyzed for AVS/SEM to evaluate the solubility of detected metals in sediment. The concentration of AVS detected in sediment ranges considerably from 0.084J to 1.1 micromoles per gram (umol/g). The ratio of SEM to AVS in three of the five samples was greater than one indicating that the metals are present in a relatively insoluble form (e.g., sulfide). Concentrations of metals observed in surface water samples are typically relatively low (compared to sediment concentrations) to not detected. In fact only one SEM metal, lead, exceeded the surface water screening criteria in Rumford River surface water samples. Based on this information, it appears that the principal mechanism for surface transport of the metals downstream is sediment transport in the Rumford River.

Elevated concentrations of PCP, apparently sourced from the Site, were detected in surface water and sediment samples in the reach of the Rumford River between the interceptor trench and the Backwash Channel.

6.0 Summary of Baseline Risk Assessments

6.1 Human Health Risk Assessment

Table 6.1-1 summarizes the results of the baseline human health risk assessment conducted for the site (M&E, 2005).

Groundwater at the site is classified by the Massachusetts Department of Environmental Protection (MADEP) as GW-2/GW-3. Therefore, groundwater may potentially serve as a source of vapors to indoor air or may discharge to surface water. MADEP does not consider the GW-1 classification (i.e., a potential drinking water source area) applicable to the site (see Appendix RR). However, some residences in the vicinity of the site have private non-potable wells. The closest non-potable wells are located on Highland Avenue to the south of the site. Because of the inferred groundwater flow direction (toward the river), private wells are not currently believed to be impacted by the site. However, MW-109R, located off-site, is considered representative of contaminant levels that may be present in off-site non-potable wells. Groundwater beneath the residences along County Street is hydrogeologically upgradient of the site.

Potential noncarcinogenic and carcinogenic human health risks were quantitatively estimated for the central tendency (CT) and reasonably maximum exposure (RME) cases for soil within the Operations Area, SE/SW quadrants, and along County Street, surface water and sediment adjacent to the site, downstream of the site, and within Fulton and Kingman Ponds, and groundwater from on-site monitoring wells. Surface water, sediment, and soil risks were estimated for the current and future adolescent trespasser and future adult and young child on-site residents. Current and future recreational users were also evaluated for fish ingestion risks for downstream and upstream ponds. Surface water and sediment risks were estimated for adult and young child area residents and recreational users, downstream of the site. In addition, the Operations Area and SE/SW quadrants were evaluated for future commercial use. The Operations Area was additionally evaluated for future town worker exposures. Future risks were also estimated for utility workers performing invasive trenching activities on-site and within County Street.

Because of the presence of non-potable wells in the vicinity of the site, current and future nearby residents were evaluated for exposures to groundwater used to fill a swimming pool, a conservative use of non-potable groundwater. Future groundwater risks associated with the drinking water ingestion and dermal contact during showering/bathing were also estimated under the conservative assumption that a non-potable well is used for household purposes in the future.

When risks were estimated for a young child and adult receptor (i.e., residents and recreational users), the young child noncarcinogenic risks (hazard indices; HIs) were presented as the most conservative, while carcinogenic risks (incremental lifetime cancer risks; ILCRs) presented represent the sum of the young child and adult risks (i.e., a total receptor risk). Medium-specific risks and hazards, as appropriate, have been summed together for receptors that are assumed to be exposed to more than one medium during site-related activities. HIs, segregated by systemic effects, are presented. In cases where the total receptor HI exceeded 1, only COPCs having similar systemic effects were summed for each pathway and medium. For those receptors with estimated ILCRs greater than the target range of 10^{-6} to 10^{-4} and target organ-specific HIs greater than 1, primary risk contributors have been discussed.

6.1.1 Risks Under Current Conditions

ILCRs and HIs estimated for the current adolescent trespasser (surface water and sediment), current fisherman (fish tissue ingestion), current County Street resident (surface soil), current area resident and recreational user (surface water and sediment), and current user of a swimming pool filled with off-site groundwater were below an ILCR of 10^{-4} and a HI of 1.

The ILCR for the current adolescent trespasser scenario exceeded an ILCR of 10^{-4} and a HI of 1 due to the presence of arsenic in Operations Area surface soil.

An evaluation of lead in soil and sediment indicated that exposures to lead, under current conditions, do not result in blood lead levels in excess of the blood lead level goal for an adolescent trespasser, area resident, recreational user, or County Street resident.

6.1.2 Potential Risks Under Future Conditions

ILCRs and HIs estimated for the future area resident and future recreational user (surface water and sediment), future County Street resident (soil), future town worker (subsurface soil), future adolescent trespasser (SE/SW quadrants soil, Operations Area subsurface soil, and sediment and surface water), future commercial worker (Operations Area indoor air; SE/SW quadrants soil and indoor air; County Street soil), future utility worker (County Street and SE/SW quadrants soil and shallow groundwater), future on-site resident (indoor air), and future fisherman (fish tissue ingestion) were below an ILCR of 10^{-4} and a HI of 1.

Should on-site groundwater migrate to off-site nonpotable wells in the future, RME ILCRs for the future user of a swimming pool filled with impacted overburden groundwater were estimated to exceed an ILCR of 10^{-4} and a HI of 1 due to the presence of PAHs, pentachlorophenol, dioxins, and arsenic in overburden groundwater.

The ILCR for the future town worker scenario exceeded an ILCR of 10^{-4} due to the presence of dioxins and arsenic in Operations Area surface soil.

The ILCR for the future adolescent trespasser scenario exceeded an ILCR of 10^{-4} and a HI of 1 due to the presence of dioxins and arsenic in Operations Area surface soil.

For the future commercial worker at the Operations Area, the ILCRs and/or HIs for both surface and subsurface soil exposure exceeded an ILCR of 10^{-4} and a HI of 1. The surface soil exceedance was due to the presence of PAHs, dioxins, and arsenic for the RME scenario, and dioxins and arsenic for the CT scenario. For subsurface soil, the ILCR exceedance was due to PAHs, pentachlorophenol, dioxins, and arsenic.

The HI for the future utility worker scenario exceeded a HI of 1 due to the presence of arsenic in Operations Area surface soil.

ILCRs and HIs for the future off-site resident drinking water ingestion and dermal contact exceeded an ILCR of 10^{-4} and a HI of 1. The following compounds were significant risk contributors in deep bedrock groundwater: 2,3,5,6-tetrachlorophenol, 2,4,6-trichlorophenol, PAHs, pentachlorophenol, arsenic, manganese, and thallium. For shallow overburden groundwater, the following compounds were significant risk contributors: trichloroethene, vinyl chloride, 2,3,5,6-tetrachlorophenol, 2,4,6-trichlorophenol, PAHs, dibenzofuran, pentachlorophenol, dioxins, arsenic, chromium, and manganese.

The ILCR for the future on-site resident scenario exceeded an ILCR of 10^{-4} due to the presence of PAHs, pentachlorophenol, dioxins, and arsenic in sediment. The on-site resident ILCR and HI for soil exposure exceeded an ILCR of 10^{-4} and/or a HI of 1 due to the presence of PAHs, dioxins, arsenic, and chromium in Operations Area surface soils, PAHs, pentachlorophenol, dioxins, and arsenic in Operations Area subsurface soils, arsenic in SE/SW quadrants surface soil, and pentachlorophenol, dioxins, and arsenic in SE/SW quadrants subsurface soil.

An evaluation of lead in soil and sediment indicated that exposures to lead, under future conditions, do not result in blood lead levels in excess of the blood lead level goal for an adolescent trespasser, area resident, recreational user, County Street resident, on-site resident, commercial worker, or utility worker. In addition, the risk associated with lead in fish fillet tissue is consistent with that associated with fish tissue not impacted by the site.

6.2 Baseline Ecological Risk Assessment

6.2.1 Introduction

The ecological risk assessment (ERA) work at the Site was performed in three phases as follows:

- In 2003, a screening-level ecological risk assessment (SLERA) was performed using only surface water and sediment analytical data obtained from the Rumford River.
- In 2004, a baseline ecological risk assessment (BERA) was performed to better quantify the extent of these potential risks associated with the Rumford River.
- In 2005, a vernal pool SLERA was performed independently of the Rumford River SLERA and BERA.

6.2.2 Results of Vernal Pool SLERA

The risk analysis for the vernal pool SLERA was based on a single surface water and sediment sample collected from each of two vernal pools at the Site (specifically, VP-C2 and VP-D1). The first step consisted of developing a screening-level problem formulation to select COCs, and develop a conceptual site model (CSM) to describe exposure pathways, identify potential receptors of concern, and select assessment and measurement endpoints. The receptors of concern for the vernal pools included benthic invertebrates, water column invertebrates, and the aquatic life stages of amphibians (i.e., tadpoles). Fish were omitted because the vernal pools have no permanent connection to the Rumford River and also dry out in the summer.

The SLERA was expanded to better quantify potential risk by calculating hazard quotients (HQs) for those COCs which exceeded their chronic surface water benchmarks and "no effect" sediment benchmarks. The evidence indicated that the potential for surface water risk was present in both vernal pools based on high levels of metals, and in VP-C2 based on high levels of PCP (HQ = 45.3). It was noted that the metals with the highest HQs (specifically, aluminum, iron, and mercury) were not associated with past activities at the site and might therefore represent background conditions.

The analysis showed that potential risk for metals in sediment was present in VP-D1, but only when evaluated using the "no effect" benchmarks. This potential risk became insignificant when evaluated using the "effect" benchmarks (i.e., all "effect" HQs < 1.0). Metals were not associated with risk in VP-C2 sediment. This evidence suggested that metals (at least those with benchmarks) were not risk drivers in vernal pool substrates.

All SVOCs exceeded their "no effect" sediment benchmarks in VP-D1. The potential risk from SVOCs (with the exception of PCP with a "no effect" HQ = 2.2, but for which an "effect" benchmark was not available) became insignificant when evaluated using "effect" benchmarks (i.e., all "effect" HQs < 1.0).

All SVOCs also exceeded their "no effect" sediment benchmarks in VP-C2. The potential risk from SVOCs, with the exception of PCP ("no effect" HQ = 1,920, but for which an "effect" benchmark was not available), fluorene ("effect" HQ = 1.8), and 2-methylnaphthalene ("effect" HQ = 3.6), became insignificant when evaluated using "effect" benchmarks (i.e., HQs < 1.0). PCP was by far the biggest risk driver in VP-C2. With such a high HQ, it is reasonable to expect toxicity in the sediment from VP-C2.

Finally, it should be noted that the analytical data from the two vernal pool sediment and surface water samples were not included in the Rumford River SLERA or BERA discussed below.

6.2.3 Results of the Rumford River SLERA

A SLERA was performed in 2003 using surface water and sediment analytical data collected from the Rumford River. The receptors of concern were benthic invertebrates and fish. The SLERA indicated the potential for risk in surface water (metals and PAHs) and sediment (metals, pesticides, PCBs, PAHs, and VOCs) from the river at the Site. Based on these findings, EPA proceeded to a BERA to better quantify the extent of these potential risks.

6.2.4 Results of the Rumford River BERA

The conceptual site model (CSM) developed for the SLERA was expanded to identify all the likely exposure pathways and receptors associated with surface water and sediments in the Rumford River. The receptor groups of concern included benthic macroinvertebrates, water column invertebrates, fish, piscivorous birds, and piscivorous mammals. Exposure routes included direct exposure to surface water or sediments for invertebrates and fish, and ingestion of surface water, sediments and aquatic biota for piscivorous wildlife.

The CSM was used as a basis for selecting assessment endpoints and measurement endpoints. The assessment endpoints represented explicit expressions of key ecological resources to be protected from harm associated with past or current releases of site-related contaminants to the Rumford River. The assessment endpoints for the HPSS BERA were selected as follows:

- Maintain a stable and healthy benthic invertebrate community in sediments from the Rumford River at the HPSS.
- Maintain a stable and healthy water column invertebrate community in the Rumford River at the HPSS.
- Maintain a stable and healthy warm water fish community in the Rumford River at the HPSS.
- Maintain stable and healthy piscivorous bird populations along the Rumford river at the HPSS.
- Maintain stable and healthy piscivorous mammal populations along the Rumford River at the HPSS.

It is generally not practical to directly quantify the risk associated with these assessment endpoints. Instead, several measurement endpoints were needed to achieve this goal. These endpoints represented measurable ecological characteristics, quantified through laboratory or field experimentation, which could be related back to the valued ecological resources chosen as the assessment endpoints. The measurement endpoints were selected to represent the same exposure pathways and mechanisms of toxicity as the assessment endpoints they represented.

The following five types of measurement endpoints were used in the BERA:

- Compare contaminant concentrations measured in surface water and sediment samples collected from the Rumford River to published benchmarks or guidelines protective of aquatic biota.
- Perform toxicity tests by exposing sensitive invertebrate and fish species to surface water and whole sediment samples collected from the Rumford River.
- Compare the concentrations of site-related contaminants measured in whole crayfish, redfin pickerel and white sucker samples collected from the Rumford River to published critical body residues (CBRs).
- Quantify the structure and function of the benthic community collected from sediments in the Rumford River.
- Use food chain modeling to calculate a total estimated daily intake (EDI) by piscivorous wildlife from exposure to surface water, sediments and aquatic biota from the Rumford River; compare the total EDIs to published toxicity reference values (TRVs).

The measurement endpoints used in this BERA varied in their ability to quantify the risks to their related assessment endpoints. Some of the measurement endpoints were generic and qualitative (e.g., national surface water or sediment benchmarks), whereas others where highly quantitative and reflected site-specific impacts at a higher level of ecological organization (e.g., benthic community survey). To support risk characterization, each measurement endpoint was provided with a descriptive weight-of-evidence score which ranged from "low-medium" to "high". The final risk integration step took this score into account to determine the potential for and significance of risk to the various assessment endpoints.

Exposure units (EUs) were defined for each assessment endpoint. The EUs included a section of the Rumford River known to have been affected by site-related contamination (the site EU) and a stretch of river upstream of the HPSS which served to quantify risks associated with background levels of contamination (the background EU). The site EU comprised the main stem of the river and the "back channel"; the latter represented an old silted-up branch of the river which drained surrounding wetlands.

The EUs were needed to determine how to summarize the available analytical data. Benthic invertebrates were an exception because they were considered to be relatively immobile. It was deemed inaccurate to estimate contaminant exposures for this receptor group based on site-wide averages. Instead, each individual sediment sample was considered its own EU in the BERA. The other receptor groups were assumed to be more mobile, with the potential to become exposed to contaminants over a larger area. Exposure to these groups was determined based on EU-wide contaminant averages and maxima. Risks associated with maximum exposures were quantified to provide an upper bound to the assessment, even though such risks were considered hypothetical and unlikely to be realized at the site.

During risk characterization, any contaminant-specific risk at the site EU was compared to its corresponding risk at the background EU by calculating a residual risk (RR). The RR was obtained by dividing the contaminant-specific site risk by its corresponding background risk. Risk at the site EU was deemed unrelated to past site activities if that risk was less than that measured in the background EU (i.e., if RR < 1.0). Such an approach allowed for a more thorough and accurate assessment of site-related impacts by factoring in background contaminant levels.

Table 6.2-1 summarizes the results of the BERA. Based on these results, it was concluded that the populations of benthic invertebrates, water column invertebrates, warm water fish, fish eating mammals, piscivorous birds associated with the Rumford River were unlikely to be at a substantial risk of harm due to exposure to contaminants associated with the site.

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Tables

Table 2.5-1: Cone Penetrometer Survey Points

Sounding Identification	Total Depth (Feet)	Video Log?
CPT-A3	19.93	Yes
CPT-A4	14.68	Yes
CPT-A5	5.79	
CPT-A6	5.08	
CPT-A7	3.27	
CPT-A8	5.77	
CPT-A10	4.83	
CPT-A11	5.33	
CPT-B1	20.62	
CPT-B2	17.43	
CPT-C1	19.33	
CPT-C3	5.18	
CPT-C4	7.28	
CPT-D1	23.21	
CPT-D2	22.22	
CPT-D3	19.54	
CPT-D4	19.84	Yes
CPT-D5	10.18	Yes
CPT-D6	8.02	
CPT-D8	4.94	
CPT-D9	5.16	
CPT-D10	5.79	
CPT-E1	25.07	
CPT-E2	30.34	
CPT-E3	16.46	Yes
CPT-E4	19.72	Yes
CPT-E6	5.1	
CPT-6A	1.28	
CPT-E7	7.59	
CPT-E8	4.6	
CPT-F1	23.11	
CPT-F4	19.02	
CPT-G1	16.44	
CPT-G3	16.24	
CPT-H1	16.6	Yes
CPT-I1	2.15	
CPT-J1	3.73	

Note: ND = Not Detected, mV = Millivolts, CPT = Cone Penetrometer Test

Table 2.6-1: Soil Sample Analyses

Location ID	*DAS/RAS ID*	*Date Sampled*	*Depth (feet)*	*XRF Screen*	*PCP Screen*	*SVOCs (D-116)*	*Metals (ILM04.1)*	*Metals D-117 (w/Hg)*	*Metals D-117 (no Hg)*	*Metals D-117 (Hg only)*	*Dioxins/ Furans (D-006.1)*	*TOC, TCO, Grain Size (D-005)*	*Comments*
SURFACE SOIL													
SS-001	D03482	11/11/2002	0-1								X		
SS-002	D03483	11/11/2002	0-0.5								X^3		
SS-002	D03484	11/11/2002	0-1								X		
SS-003	D03485	11/11/2002	0-1								X		
SS-004	D03486	11/11/2002	0-1								X		
SS-005	D03487	11/11/2002	0-0.5								X^3		
	D03488	11/11/2002	0-1								X		
SS-006	D03489	11/11/2002	0-1								X		Next to SS-021
SS-007	D03490	11/11/2002	0-1								X		Next to SS-034
SS-008	D03491	11/11/2002	0-1								X		Next to SS-022
SS-009	D03492	11/11/2002	0-0.5								X^3		
	D03493	11/11/2002	0-1								X		
SS-010	D03494	11/11/2002	0-1								X		
SS-011	D03495	11/12/2002	0-1								X		Next to SS-037
SS-012	D03496	11/12/2002	0-1								X		
SS-013	D03497	11/12/2002	0-0.5								X^3		
SS-013	D03498	11/12/2002	0-1								X		
SS-014	D03499	11/12/2002	0-1								X		
SS-015	D03500	11/12/2002	0-1								X		Next to SS-039
	D03646	11/19/2002	0-1			X							
SS-016	D03643	11/19/2002	0-1			X							
	D03644*	11/19/2002	0-1			X							
	D03501	11/12/2002	0-1								X		
	D03530*	11/12/2002	0-1								X		
SS-017	D03502	11/12/2002	0-1								X		

Table 2.6-1: Soil Sample Analyses

Location ID	*DAS/RAS ID*	*Date Sampled*	*Depth (feet)*	*XRF Screen*	*PCP Screen*	*SVOCs (D-116)*	*Metals (ILM04.1)*	*Metals D-117 (w/Hg)*	*Metals D-117 (no Hg)*	*Metals D-117 (Hg only)*	*Dioxins/ Furans (D-006.1)*	*TOC, TCO, Grain Size (D-005)*	*Comments*
SS-018	D03647	11/19/2002	0-1			X							Next to SS-040
	D03503	11/12/2002	0-1								X		
SS-019	D03504	11/12/2002	0-1								X		Next to SS-024 and SS-043
SS-020	D03505	11/12/2002	0-1								X^3		
	D03506	11/12/2002	0-1								X		
SS-021	--	11/11/2002	0-0.5		X								Next to SS-006
	D03507	11/11/2002	0-1		X	X							
SS-022	--	11/11/2002	0-0.5		X								Next to SS-008
	D03508	11/11/2002	0-1		X	X							
SS-023	--	11/12/2002	0-0.5		X								Sample location removed during County Street Removal Action
	D03511	11/12/2002	0-1		X	X							
SS-024	--	11/12/2002	0-0.5		X								Next to SS-019 and SS-043
	D03509	11/12/2002	0-1		X	X							
	D03532*	11/12/2002	0-1			X							
SS-025	--	11/12/2002	0-0.5		X								Next to SS-045
	D03510	11/12/2002	0-1		X	X							
SS-026	MAJF67	11/11/2002	0-1				X						
SS-027	D03648	11/19/2002	0-1			X					X		Sample location removed during County Street Removal Action
	D03512	11/7/2002	0-1	X				X					
SS-028	--	11/7/2002	0-0.5	X									Sample location removed during County Street Removal Action
	D03649	11/19/2002	0-1			X					X		
	D03513	11/7/2002	0-1	X					X (dry)				
	D03514	11/7/2002	0-1							X			

Table 2.6-1: Soil Sample Analyses

Location ID	*DAS/RAS ID*	*Date Sampled*	*Depth (feet)*	*XRF Screen*	*PCP Screen*	*SVOCs (D-116)*	*Metals (ILM04.1)*	*Metals D-117 (w/Hg)*	*Metals D-117 (no Hg)*	*Metals D-117 (Hg only)*	*Dioxins/ Furans (D-006.1)*	*TOC, TCO, Grain Size (D-005)*	*Comments*
SS-029	--	11/7/2002	0-0.5	X									
	D03650	11/19/2002	0-1								X		
	D03515	11/7/2002	0-1	X					X (dry)				Sample location removed during County Street Removal Action
	D03517*	11/7/2002	0-1	X					X (dry)				
	D03516	11/7/2002	0-1							X			
	D03518*	11/7/2002	0-1							X			
SS-030	D03651	11/19/2002	0-1			X					X		
	D03652*	11/19/2002	0-1								X		
	D03519	11/7/2002	0-1	X				X					
SS-031	D03653	11/19/2002	0-1			X					X		
	D03533	11/7/2002	0-1	X				X					
SS-032	D03654	11/19/2002	0-1			X					X		Sample location removed during County Street Removal Action
	D03534	11/7/2002	0-1	X				X					
SS-033	MAJF62	11/11/2002	0-1				X						
SS-034	--	11/11/2002	0-0.5	X									
	MAJF63	11/11/2002	0-1				X (dry)						Next to SS-007
	MAJF64	11/11/2002	0-1	X			X						
SS-035	D03645	11/19/2002	0-1			X					X		
	D03535	11/7/2002	0-1	X				X					
SS-036	D03656	11/19/2002	0-1			X					X		
	D03536	11/7/2002	0-1	X				X					
SS-037	MAJF66	11/12/2002	0-1				X						Next to SS-011
SS-038	MAJF65	11/12/2002	0-1				X						
SS-039	--	11/12/2002	0-0.5	X									
	MAJF68	11/12/2002	0-1				X (dry)						Next to SS-015
	MAJF77*						X						
	MAJF69	11/12/2002	0-1	X			X						

Table 2.6-1: Soil Sample Analyses

Location ID	*DAS/RAS ID*	*Date Sampled*	*Depth (feet)*	*XRF Screen*	*PCP Screen*	*SVOCs (D-116)*	*Metals (ILM04.1)*	*Metals D-117 (w/Hg)*	*Metals D-117 (no Hg)*	*Metals D-117 (Hg only)*	*Dioxins/ Furans (D-006.1)*	*TOC, TCO, Grain Size (D-005)*	*Comments*
	MAJF78*	11/12/02	0-1				X						
SS-040	MAJF70	11/12/2002	0-1				X						Next to SS-018
SS-041	D03655	11/19/2002	0-1			X							
	MAJF71	11/12/2002	0-1				X						
SS-042	MAJF72	11/12/2002	0-1				X						
SS-043	--	11/12/2002	0-0.5	X									Next to SS-019 and SS-024
	MAJF73	11/12/2002	0-1				X (dry)						
	MAJF74	11/12/2002	0-1	X			X						
SS-044	D03642	11/19/2002	0-1			X							
	MAJF75	11/12/2002	0-1				X						
SS-045	MAJF76	11/12/2002	0-1				X						Next to SS-025
SS-046	D03537	11/6/2002	0-1	X				X[1]					Off-Site Background Samples – F. Gilbert Hills State Forest
SS-047	D03538	11/6/2002	0-1	X				X[1]					
SS-048	D03539	11/6/2002	0-1	X				X[1]					
SS-049	D03540	11/6/2002	0-1	X				X[1]					
SS-050	D03541	11/6/2002	0-1	X				X[1]					
SS-051	D03542	11/6/2002	0-1	X				X					
SS-052	--	11/6/2002	0-0.5	X									Off-Site Background Samples – Plymouth Street Recreation Facility Playing Fields
	D03543	11/6/2002	0-1	X					X (dry)				
	D03544	11/6/2002	0-1							X			
SS-053	D03545	11/6/2002	0-1	X				X[1]					
SS-054	--	11/6/2002	0-0.5	X									Off-Site Background Samples – Memorial Park Playing Fields
	D03546	11/6/2002	0-1	X					X (dry)				
	D03547	11/6/2002	0-1							X			
SS-055	D03548	11/6/2002	0-1	X				X[1]					

Table 2.6-1: Soil Sample Analyses

Location ID	*DAS/RAS ID*	*Date Sampled*	*Depth (feet)*	*XRF Screen*	*PCP Screen*	*SVOCs (D-116)*	*Metals (ILM04.1)*	*Metals D-117 (w/Hg)*	*Metals D-117 (no Hg)*	*Metals D-117 (Hg only)*	*Dioxins/ Furans (D-006.1)*	*TOC, TCO, Grain Size (D-005)*	*Comments*
SS-056	--	11/6/2002	0-0.5	X									Off-Site Background Samples – Hutchinson Property (Route 106 Fields)
	D03549	11/6/2002	0-1	X					X (dry) [1]				
	D03550	11/6/2002	0-1							X[1]			
SS-057	D03551	11/6/2002	0-1	X				X					
SS-058	D03657	11/20/2002	0-1			X							
	MAJF80	11/20/2002	0-1				X						
SS-059	D03658	11/20/2002	0-1			X							
	MAJF81	11/20/2002	0-1				X						
SS-060	D03659	11/20/2002	0-1			X							
	MAJF82	11/20/2002	0-1				X						
SS-061	D03660	11/20/2002	0-1			X							
	MAJF83	11/20/2002	0-1				X						
SS-062	D03663	11/20/2002	0-1			X							
	D03664*	11/20/2002	0-1			X							
	MAJF86	11/20/2002	0-1				X						
	MAJF87*	11/20/2002	0-1				X						
SS-063	D03662	11/20/2002	0-1			X							
	MAJF85	11/20/2002	0-1				X						
SS-064	D03661	11/20/2002	0-1			X							
	MAJF84	11/20/2002	0-1				X						
SUBSURFACE SOIL													
SB-001	D03458	11/14/2002	1-4	X	X	X					X	X	
	D03459	11/14/2002	4-10	X	X	X					X	X	
SB-002	D03460	11/14/2002	1-4		X						X		
	D03461	11/14/2002	4-10	X	X						X		
	MAJF90	11/14/2002	1-4	X			X (dry)						
	MAJF91	11/14/2002	1-4				X						

Table 2.6-1: Soil Sample Analyses

Location ID	*DAS/RAS ID*	*Date Sampled*	*Depth (feet)*	*XRF Screen*	*PCP Screen*	*SVOCs (D-116)*	*Metals (ILM04.1)*	*Metals D-117 (w/Hg)*	*Metals D-117 (no Hg)*	*Metals D-117 (Hg only)*	*Dioxins/ Furans (D-006.1)*	*TOC, TCO, Grain Size (D-005)*	*Comments*
SB-003	D03462	11/14/2002	1-4		X	X					X	X	
	D03528*	11/14/2002	1-4			X					X	X	
	D03463	11/14/2002	4-10	X	X	X					X	X	
	MAJF92	11/14/2002	1-4	X			X (dry)						
	MAJF94*	11/14/2002	1-4	X			X (dry)						
	MAJF93	11/14/2002	1-4				X						
	MAJF95*	11/14/2002	1-4				X						
SB-004	D03464	11/14/2002	1-4		X						X		
	D03465	11/14/2002	4-10	X	X						X		
	MAJF96	11/14/2002	1-4	X			X (dry)						
	MAJF97	11/14/2002	1-4				X						
SB-005	D03466	11/14/2002	1-4	X	X						X		
	D03467	11/14/2002	4-10	X	X						X		
SB-006	D03468	11/14/2002	1-4		X						X		
	D03469	11/14/2002	4-10	X	X						X		
	MAJF98	11/14/2002	1-4	X			X (dry)						
	MAJF99	11/14/2002	1-4				X						
SB-007	D03470	11/13/2002	1-4	X	X						X		
	D03471	11/13/2002	4-10	X	X						X		
SB-008	D03472	11/13/2002	1-4		X						X		
	D03473	11/13/2002	4-10	X	X						X		
	MAJG00	11/13/2002	1-4	X			X (dry)						
	MANH09	11/13/2002	1-4				X						
SB-009	D03474	11/13/2002	1-4	X	X						X		
	D03475	11/13/2002	4-10	X	X						X		

Table 2.6-1: Soil Sample Analyses

Location ID	*DAS/RAS ID*	*Date Sampled*	*Depth (feet)*	*XRF Screen*	*PCP Screen*	*SVOCs (D-116)*	*Metals (ILM04.1)*	*Metals D-117 (w/Hg)*	*Metals D-117 (no Hg)*	*Metals D-117 (Hg only)*	*Dioxins/ Furans (D-006.1)*	*TOC, TCO, Grain Size (D-005)*	*Comments*
SB-010	D03476	11/13/2002	1-4		X	X					X	X	
	D03477	11/13/2002	4-10		X	X					X	X	
	MANH10	11/13/2002	1-4	X			X (dry)						
	MANH11	11/13/2002	1-4	X			X						
	MANH12	11/13/2002	4-10	X			X (dry)						
	MANH13	11/13/2002	4-10				X						
SB-011	D03478	11/13/2002	1-4	X	X						X		
	D03479	11/13/2002	4-10	X	X						X		
SB-012	D03480	11/13/2002	1-4		X	X					X	X	
	D03481	11/13/2002	4-10	X	X	X					X	X	
	MANH14	11/13/2002	1-4	X			X (dry)						
	MANH15	11/13/2002	1-4				X						

Notes:

1) X^1 denotes sample sent to lab but metals analysis cancelled on 11/18/02
3) X^3 denotes sample sent to lab but put on hold; never analyzed
* Denotes a field duplicate
(dry) indicates dried aliquot for metals analyses.
Shaded samples indicate sample location was removed during Emergency Removal Action.

Table 2.7-1: Well Construction Details							
Well Identification	*Date Installed*	*Total Depth*	*Depth to Top of Screen*	*Depth to Bottom of Screen*	*Formation Screened*	*Well Diameter*	*Reference Elevation (Top of PVC Well Casing)*
MW-001	Dec-87	11	6	11	Overburden	2" PVC	98.51
MW-002	Dec-87	16	6	16	Overburden	2" PVC	100.11
MW-003	Dec-87	18	7	18	Overburden	4" SS	96.33
MW-004	Dec-87	17	7	17	Overburden	2" PVC	101.32
MW-005A	Dec-87	14.5	4.5	14.5	Overburden	2" PVC	100.05
MW-005B	Dec-87	29.2	19.2	29.2	Overburden	2" PVC	99.38
MW-006	Dec-87	16.5	6.5	16.5	Overburden	2" PVC	99.65
MW-007A	Dec-87	17	7	17	Overburden	2" PVC	98.35
MW-007B	Dec-87	35	25	35	Overburden	2" PVC	96.44
MW-008A	Jan-89	18	8	18	Overburden	2" PVC	99.92
MW-008B	Jan-89	38	28	38	Bedrock	2" PVC	100.58
MW-009A	Jan-89	18	8	18	Overburden	2" PVC	99.98
MW-009B	Jan-89	61	51	61	Bedrock	2" PVC	100
MW-010	Jan-89	17	7	17	Overburden	2" PVC	87.83
MW-011	Jan-89	17	7	17	Overburden	2" PVC	NA
MW-012	Jan-89	17	7	17	Overburden	2" PVC	95.56
MW-A*	Unknown	18.5	8.5	18.5	Overburden	2" PVC	92.44
MW-B*	Unknown	7.5	2.5	7.5	Overburden	2" PVC	NA
MW-C*	Unknown	18.5	8.5	18.5	Overburden	2" PVC	91.14
MW-D*	Unknown	9.0	4.0	9.0	Overburden	2" PVC	91.59
MW-E*	Unknown	8.0	3.0	8.0	Overburden	2" PVC	91.71
MW-F*	Unknown	7.5	2.5	7.5	Overburden	2" PVC	88.07
MW-G*	Unknown	15.5	5.5	15.5	Overburden	2" PVC	92.01
PW-001	Jan-89	48.5	38.5	48.5	Bedrock	4" PVC	97.12
RCA-01	Feb-99	19	4	19	Overburden	2" PVC	106.22
RCA-02	Feb-99	15	2	15	Overburden	2" PVC	101.62
RCA-03	Feb-99	16.4	7.5	15	Overburden	2" PVC	97.91
RCA-04	Feb-99	17	3	17	Overburden	2" PVC	101.65
RCA-05	Feb-99	10	3	10	Overburden	2" PVC	101.04
RCA-06	Feb-99	15	3	15	Overburden	2" PVC	101.24
RCA-07	Feb-99	12	3	12	Overburden	2" PVC	97.68
RCA-08	Feb-99	19	4	19	Overburden	2" PVC	100.74
RCA-09	Feb-99	18	4	18	Overburden	2" PVC	98.95
BR-001	Feb-99	30	20	25	Bedrock	2" PVC	100.98
BR-002	Feb-99	26	11	26	Bedrock	2" PVC	97.75
PZ-001	Nov-02	10	1	9.31	Overburden	1" PVC	93.53
PZ-002	Nov-02	10	0.71	9.71	Overburden	1" PVC	91.4

Table 2.7-1: Well Construction Details							
Well Identification	*Date Installed*	*Total Depth*	*Depth to Top of Screen*	*Depth to Bottom of Screen*	*Formation Screened*	*Well Diameter*	*Reference Elevation (Top of PVC Well Casing)*
PZ-004	Nov-02	11	0.55	10.55	Overburden	1" PVC	NA
PZ-005	Nov-02	12	1.5	11.5	Overburden	1" PVC	NA
PZ-006	Nov-02	10	0.58	9.68	Overburden	1" PVC	NA
PZ-007	Nov-02	14	1.45	13.45	Overburden	1" PVC	98.65
PZ-008	Nov-02	14	2.31	12.31	Overburden	1" PVC	98.91
MW-101R	Nov-03	40	30	40	Bedrock	2" PVC	96.21
MW-103R	Nov-03	49	39	49	Bedrock	2" PVC	97.68
MW-105R	Nov-03	46.5	36.5	46.5	Bedrock	2" PVC	89.86
MW-107R	Aug-04	45.5	35.5	45.5	Bedrock	2" PVC	NA
MW-109R	Aug-04	55	45	55	Bedrock	2" PVC	NA
MW-111R	Aug-04	65.7	55.7	65.7	Bedrock	2" PVC	NA
PW-1	Jan-89	48.5	38.5	48.5	Bedrock	4" PVC	98.81

Notes:
* Indicates construction details are estimated based on field observations. Construction diagrams were not available.

Table 2.7-2: Ground Water Sample Analyses

Location ID	*RAS ID*	*DAS ID*	*Date Sampled*	*SVOCs (D-118/ D-119)*	*SVOCs (OLM04.3, D-119.1, D-131)*	*Metals/ CN (D-004.1/)*	*Metals (D-004.1)*	*Dioxins/ Furans (D-006.1)*
Remedial Investigation Phase I								
PZ-001	NA	D03559	12/11/2002	X			X	
PZ-002	NA	D03560	12/11/2002	X			X	
PZ-004	NA	D03563	12/12/2002	X			X	
PZ-005	NA	D03564	12/12/2002	X			X	
PZ-006	NA	D03565	12/12/2002	X			X	
PZ-007	NA	D03566	12/11/2002	X			X	
PZ-008	NA	D03562	12/10/2002	X			X	
	NA	D03561*	12/10/2002	X			X	
Remedial Investigation Phase II								
BR-001	A18B7	D04387	12/11/2003		X		X	
BR-002	A18B8	D04388	12/17/2003		X		X	
MW-001	Not Sampled - Dry							
MW-002	A18N0	D04390	12/10/2003		X		X	
	A18Q9*	D04419*	12/10/2003		X		X	
MW-003	A18N1	D04391	12/11/2003		X		X	
MW-004	A18N2	D04392	12/12/2003		X		X	
MW-005A	A18N3	D04393	12/15/2003		X		X	
MW-005B	A18N4	D04394	12/11/2003		X		X	
MW-006	A18N5	D04395	12/16/2003		X		X	
MW-007A	A18N6	D04396	12/16/2003		X		X	
MW-007B	A18N7	D04397	12/16/2003		X		X	
MW-008A	A18N8	D04398	12/18/2003		X		X	
MW-008B	A18N9	D04399	12/18/2003		X		X	
MW-009B	A18P0	D04400	12/17/2003		X		X	
	A18R0*	D04420*	12/17/2003		X		X	
MW-010	A18P1	D04401	12/16/2003		X		X	
MW-101R	A18P2	D04402	12/15/2003		X		X	
MW-103R	A18P3	D04403	12/18/2003		X		X	
MW-105R	A18P4	D04404	12/12/2003		X		X	
MW-A	A18P5	D04405	12/15/2003		X		X	
MW-G	A18P6	D04406	12/12/2003		X		X	
PZ-002	A18P7	D04407	12/12/2003		X		X	
PZ-007	A18P8	D04408	12/15/2003		X		X	
PZ-008	A18P9	D04409	12/16/2003		X		X	
RCA-01	A18Q0	D04410	12/11/2003		X		X	
RCA-02	A18Q1	D04411	12/11/2003		X		X	
RCA-03	A18Q2	D04412	12/12/2003		X		X	
RCA-04	A18Q3	D04413	12/12/2003		X		X	
RCA-05	A18Q4	D04414	12/10/2003		X		X	
RCA-06	A18Q5	D04415	12/10/2003		X		X	

Table 2.7-2: Ground Water Sample Analyses

Location ID	*RAS ID*	*DAS ID*	*Date Sampled*	*SVOCs (D-118/ D-119)*	*SVOCs (OLM04.3, D-119.1, D-131)*	*Metals/ CN (D-004.1/)*	*Metals (D-004.1)*	*Dioxins/ Furans (D-006.1)*
RCA-07	Not sampled – LNAPL present							
RCA-08	A18Q7	D04417	12/18/2003		X		X	
RCA-09	A18Q8	D04418	12/18/2003		X		X	
Remedial Investigation Phase II Supplemental Ground Water Sampling								
MW-101R	NA	D04787	04/16/2004		X**			
PW-001	NA	D04788	04/15/2004		X**			
MW-101R*	A18S0	D05186	10/14/2004		X		X	
MW-101R	A18R8	D05184	10/14/2004		X		X	
MW-103R	A18R9	D05185	10/14/2004		X		X	
MW-105R	A18S1	D05187	10/13/2004		X		X	
MW-107R	A18S2	D05188	10/13/2004		X		X	
MW-109R	A18S3	D05189	10/14/2004		X		X	
MW-111R	A18S4	D05190	10/14/2004		X		X	

Note:
* Denotes Field Duplicate
** Sample analyzed for D-119.1 only

Table 2.8-1: Surface Water Analyses

Location ID	*Field Sample ID*	*RAS ID*	*DAS ID*	*Date Sampled*	*VOCs D-078*	*SVOCs D-082/ D-083*	*SVOCs OLM04.3*	*PAHs D-131*	*Total & Dissolved Metals D-004.1*	*Total & Dissolved Mercury D-067.1*	*Total Metals ILM04.1*	*Dissolved Metals ILM04.1*	*Cyanide D-004.1*	*Dioxins/ Furans D-006.1*	*Toxicity Testing*	*Comments*
Remedial Investigation Phase II																
SW-015	SW-015	NA	D04236	10/21/2003				X							X	Rumford River downstream of site
		A10W1	NA				X									
		MA10W1	NA								X					
		MA1848	NA									X				
SW-015	SW-017	NA	D04238	10/23/2003				X							X	Rumford River downstream of site
		NA	D04245*					X								
		A10W3	NA				X									
		A10X0*	NA				X									
		MA10W3	NA								X					
		MA10X0*	NA								X					
		MA1850	NA									X				
		MA18A2*	NA									X				
SW-015	SW-019	NA	D04240	10/27/2003				X							X	Rumford River downstream of site
		A10W5	NA				X									
		MA10W5	NA								X					
		MA1852	NA									X				
SW-016	SW-016	NA	D04237	10/21/2003				X							X	Rumford River upstream of Site
		A10W2	NA				X									
		MA10W2	NA								X					
		MA1849	NA									X				
SW-016	SW-018	NA	D04239	10/23/2003				X							X	Rumford River upstream of Site
		A10W4	NA				X									
		MA10W4	NA								X					
		MA1851	NA									X				
SW-016	SW-020	NA	D04241	10/27/2003				X							X	Rumford River upstream of Site
		A10W6	NA				X									
		MA10W6	NA								X					
		MA1853	NA									X				

Note:
* Denotes Field Duplicate

Table 2.8-2: Sediment Sample Analyses

Location ID	*DAS ID*	*Date Sampled*	*Depth (feet)*	*VOCs D-077*	*SVOCs D-080*	*SVOCs D-116*	*Pesticides/ PCB's D-081*	*AVS/ SEM D-079*	*Dioxins/ Furans D-006.1*	*Metals D-044.1*	*Metals D-117*	*Cyanide D-044.1*	*Grain Size/ TOC/ TCO D-005*	*Toxicity Testing*	*Comments*
Remedial Investigation Phase I															
SD-020	D03445	11/5/2002	0 - 0.5			X			X		X		X		Rumford River Backwash Channel
	D03446*	11/5/2002	0 - 0.5			X			X		X		X		
SD-021	D03447	11/5/2002	0 - 0.5			X			X		X		X		Rumford River Backwash Channel
SD-022	D03448	11/5/2002	0 - 0.5			X			X		X		X		Rumford River Backwash Channel
Remedial Investigation Phase II															
SD-023	D04221	10/27/2003	0 - 0.75			X			X		X		X		Off site/downstream – Fulton Pond
SD-024	D04222	10/28/2003	0 - 1.0			X			X		X		X		Off site/downstream – Fulton Pond
	D04227*	10/28/2003	0 - 1.0			X			X		X		X		
SD-025	D04223	10/28/2003	0 - 1.0			X			X		X		X		Off site/downstream – Fulton Pond
SD-026	D04224	10/27/2003	0 - 0.5			X		X	X		X		X**	X	Rumford River – downstream of Site
	D04228*	10/27/2003	0 - 0.5					X							
SD-027	D04225	10/27/2003	N/R			X		X	X		X		X**	X	Rumford River – upstream of Site

Note:
N/R = Not Recorded in field notes
* Denotes Field Duplicate
** Denotes TOC/TCO Analyses only (no Grain Size Analysis)

Table 2.8-3: Fish Tissue Analyses								
Location ID	*Field Sample ID*	*DAS ID*	*Date Sampled*	*PAHs & Biphenyl (D-132)*	*Dioxins/ Furans (D-133)*	*Metals (D-134)*	*Chloro-phenols (D-135)*	*Lipids (D-058.1)*
Filet Samples								
BP-LMB	BP-092503-LMB-FI	D04251	9/25/2003	X	X	X	X	X
BP-WS	BP-092503-WS-FI	D04252	9/25/2003	X	X	X	X	X
BP-YP	BP-092503-YP-FI	D04253	9/25/2003	X	X	X	X	X
FP-WS	FP-092503-WS-FI	D04254	9/25/2003	X	X	X	X	X
FP-YP	FP-092503-YP-FI	D04255	9/25/2003	X	X	X	X	X
KP-LMB	KP-092503-LMB-FI	D04256	9/25/2003	X	X	X	X	X
KP-LMB	KP-092503-LMB-FI-DUP*	D04257	9/25/2003	X	X	X	X	X
Whole Body Samples								
RR-UP-WS	RR-110703-UP-WS-WB	D04258	10/16/2003	X	X	X	X	X
RR-UP-PICK	RR-110703-UP-PICK-WB	D04259	10/16/2003	X	X	X	X	X
RR-UP-CRAY	RR-110703-UP-CRAY-WB	D04260	10/16/2003	X	X	X	X	X
RR-SITE-WS	RR-110703-SITE-WS-WB	D04261	10/16/2003	X	X	X	X	X
RR-SITE-PICK	RR-110703-SITE-PICK-WB	D04262	10/16/2003	X	X	X	X	X
RR-SITE-CRAY	RR-110703-SITE-CRAY-WB	D04263	10/16/2003	X	X	X	X	X

Note:
* - denotes field duplicate.

Table 3.2-1: Overburden Ground Water Elevations

Location	Reference Elevation (feet)	December 9, 2002			December 5, 2003			April 7, 2004		
		Depth to Water (feet)	Product Thickness (feet)	Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Water Elevation (feet)
MW-001	98.51	DRY	NM	NM	DRY	NA	NA	6.03	0.00	92.48
MW-002	100.11	9.69	0.00	90.42	10.06	0.00	90.05	7.68	0.00	92.43
MW-003	96.33	10.47	0.00	85.86	10.69	0.00	85.64	8.82	0.00	87.51
MW-004	101.32	9.10	0.00	92.22	9.11	0.00	92.21	8.20	0.00	93.12
MW-005A	100.05	10.20	0.60	89.85	10.21	0.44	89.84	8.32	0.00	91.73
MW-005B	99.38	NM	NM	NM	9.24	0.00	90.14	7.68	0.00	91.70
MW-006	99.65	9.35	0.00	90.30	9.65	0.00	90.00	7.56	0.00	92.09
MW-007A	98.35	10.23	0.00	88.12	10.25	0.00	88.10	9.25	0.00	89.10
MW-007B	96.44	8.41	0.00	88.03	8.47	0.00	87.97	7.65	0.00	88.79
MW-008A	99.92	11.50	0.00	88.42	11.71	0.00	88.21	10.10	0.00	89.82
MW-009A	99.98	11.78	0.00	88.20	11.92	0.00	88.06	10.73	0.00	89.25
MW-010	87.83	4.96	0.00	82.87	5.05	0.00	82.78	4.40	0.00	83.43
MW-012	95.56	11.33	0.91	84.23	11.35	0.87	84.21	10.70	1.13	84.86
MW-A	92.44	10.12	0.00	82.32	10.10	0.00	82.34	9.37	0.00	83.07
MW-B	NM	4.76	0.00	NM	4.83	0.09	NA	NA	NA	NA
MW-C	91.14	8.75	0.00	82.39	8.73	0.00	82.41	NA	NA	NA
MW-D	91.59	4.81	0.02	86.78	4.78	0.00	86.81	NA	NA	NA
MW-E	91.71	4.77	0.03	86.94	4.73	0.01	86.98	NA	NA	NA
MW-F	88.07	5.35	0.25	82.72	5.33	0.25	82.74	NA	NA	NA
MW-G	92.01	4.94	0.00	87.07	4.93	0.00	87.08	4.27	0.00	87.74
PZ-001	93.53	5.62	0.00	87.91	5.66	0.00	87.87	4.99	0.00	88.54
PZ-002	91.40	3.02	0.00	88.38	3.25	0.00	88.15	2.99	0.00	88.41
PZ-007	98.65	10.39	0.00	88.26	10.46	0.00	88.19	9.54	0.00	89.11
PZ-008	98.91	9.68	0.00	89.23	9.71	0.00	89.20	8.71	0.00	90.20
RCA-01	106.22	12.62	0.00	93.60	12.83	0.00	93.39	10.86	0.00	95.36
RCA-02	101.62	8.92	0.00	92.70	9.00	0.00	92.62	7.88	0.00	93.74
RCA-03	97.91	13.77	0.00	84.14	13.99	0.00	83.92	12.66	0.00	85.25
RCA-04	101.65	13.40	0.00	88.25	13.37	0.00	88.28	12.54	0.00	89.11
RCA-05	101.04	8.83	0.00	92.21	8.93	0.00	92.11	7.26	0.00	93.78
RCA-06	101.24	10.54	0.00	90.70	10.99	0.00	90.25	8.21	0.00	93.03
RCA-07	97.68	9.91	0.77	87.77	10.28	0.75	87.40	9.41	0.73	88.27
RCA-08	100.74	12.40	0.00	88.34	12.58	0.00	88.16	11.10	0.00	89.64
RCA-09	98.95	11.01	0.00	87.94	11.17	0.00	87.78	9.73	0.00	89.22

Table 3.2-2: Bedrock Ground Water Elevations

Location	Reference Elevation (feet)	December 9, 2002			December 5, 2003			April 7, 2004		
		Depth to Water (feet)	Product Thickness (feet)	Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Water Elevation (feet)	Depth to Water (feet)	Product Thickness (feet)	Water Elevation (feet)
BR-001	100.98	8.48	0.00	92.50	8.62	0.00	92.36	6.92	0.00	94.06
BR-002	97.75	9.78	0.00	87.97	10.88	0.00	86.87	8.92	0.00	88.83
MW-008B	100.58	12.06	0.00	88.52	12.27	0.00	88.31	10.69	0.00	89.89
MW-009B	100.00	11.36	0.00	88.64	11.51	0.00	88.49	10.19	0.00	89.81
MW-101R	96.21	NA	NA	NA	8.28	0.00	87.93	7.36	0.00	88.85
MW-103R	97.68	NA	NA	NA	11.05	0.00	86.63	8.26	0.00	89.42
MW-105R	89.86	NA	NA	NA	2.00	0.00	87.86	1.05	0.00	88.81
MW-107R	NS									
MW-109R	NS									
MW-111R	NS									
PW-001	97.12	9.22	0.00	87.90	9.28	0.00	87.84	8.54	0.00	88.58

NM = Not Measured
NS = Not surveyed

Table 3.2-3: Summary of Hydraulic Conductivity Values

Test Well	Material Tested	Hydraulic Conductivity (cm/sec)			
		Slug Test Results		Literature Values	
		Test No. 1	Test No. 2	Freeze & Cherry[1]	Domenico & Schwartz[2]
RCA-02	Fm sand	3.4×10^{-3}	2.1×10^{-3}	0.1×10^{-3} to $1{,}000 \times 10^{-3}$	0.02×10^{-3} to 50×10^{-3}
RCA-09	Fc sand and fc gravel	0.3×10^{-3}	6.0×10^{-3}	0.1×10^{-3} to $10{,}000 \times 10^{-3}$	0.02×10^{-3} to 600×10^{-3}
MW-010	Fc sand, tr fm gravel	9.9×10^{-3}	NA	0.1×10^{-3} to $10{,}000 \times 10^{-3}$	0.02×10^{-3} to 600×10^{-3}

Notes:

[1] Freeze, R.A. and J.A. Cherry, 1979. Groundwater. Prentice Hall.

[2] Domenico, P.A. and F.W. Schwartz, 1990. Physical and Chemical Hydrogeology. John Wiley & Sons.

Table 3.2-4: Calculation of Transmissivity

Location	Hydraulic Conductivity (cm/s)	Depth to Water December 2003 (ft)	Depth to Bedrock (ft)	Saturated Thickness (ft)	Transmissivity (ft^2/day)
RCA-02	3.4×10^{-3}	8.92	24	15.08	**146.0**
RCA-09	6.0×10^{-3}	11.01	12	0.99	**16.9**
MW-010	9.9×10^{-3}	4.96	7	2.04	**57.6**

Table 4.0-1: Screening Criteria

Analyte	CAS Number	Soil (mg/kg)	Sediment (ug/kg)	Ground Water (ug/L)	Surface Water (ug/L)	Fish Tissue (ug/kg)
VOCs						
Acetone	67-64-1	600 a	8.7 c	--	1,500 h	--
Benzene	71-43-2	1.3 a	160 c	5 g	130 h	--
Bromodichloromethane	75-27-4	1.8 a	--	80 g	--	--
Bromoform	75-25-2	220 a	650 c	80 g	320 h	--
Bromomethane	74-83-9	1.3 a	--	--	--	--
2-Butanone (MEK)	78-93-3	2700 a	270 c	--	14,000 h	--
Carbon Disulfide	75-15-0	120 a*	0.85 c	--	0.92 h	--
Carbon Tetrachloride	56-23-5	0.55 a	47 c	5 g	9.8 h	--
Chlorobenzene	108-90-7	53 a	410 c	100 g	64 h	--
Chloroethane	75-00-3	6.5 a	--	--	--	--
Chloroform	67-66-3	1.2 a	22 c	80 g	28 h	--
Chloromethane	74-87-3	2.6 a	--	--	--	--
cis-1,2-Dichloroethene	156-59-2	15 a	400 c	70 g	590 h	--
cis-1,3-Dichloropropene	10061-01-5	1.8 a (1)	0.051 c (1)	--	0.055 h (1)	--
Cyclohexane	110-82-7	140 a	--	--	--	--
Dibromochloromethane	124-48-1	2.6 a	--	80 g	--	--
1,2-Dibromo-3-chloropropane	96-12-8	2 a	--	0.2 g	--	--
1,2-Dibromoethane (EDB)	106-93-4	0.028 a	--	0.05 g	--	--
1,2-Dichlorobenzene	95-50-1	370 a	330 c	600 g	14 h	--
1,3-Dichlorobenzene	541-73-1	6.3 a	1,700 c	--	71 h	--
1,4-Dichlorobenzene	106-46-7	7.9 a	340 c	75 g	15 h	--
Dichlorodifluoromethane	75-71-8	31 a	--	--	--	--
1,1-Dichloroethane	75-34-3	170 a	27 c	--	47 h	--
1,2-Dichloroethane	107-06-2	0.6 a	250 c	5 g	910 h	--
1,1-Dichloroethene	75-35-4	41 a	31 c	7 g	25 h	--
trans-1,2-Dichloroethene	156-60-5	23 a	400 c	100 g	590 h	--
1,2-Dichloropropane	78-87-5	0.74 a	--	5 g	--	--
Trans-1,3-Dichloropropene	10061-02-6	1.8 a (1)	0.051 c (1)	--	0.055 h (1)	--
Ethylbenzene	100-41-4	20 a	89 c	700 g	7.3 h	--
Freon 113	76-13-1	5600 a	--	--	--	--
2-Hexanone	591-78-6	--	22 c	--	99 h	--

Table 4.0-1: Screening Criteria

Analyte	CAS Number	Soil (mg/kg)	Sediment (ug/kg)	Ground Water (ug/L)	Surface Water (ug/L)	Fish Tissue (ug/kg)
Isopropylbenzene	98-82-8	200 a	--	--	--	--
Methyl Acetate	79-20-9	9,200 a	--	--	--	--
Methyl tert-butyl ether	1634-04-4	160 a	--	--	--	--
4-Methyl-2-pentanone	108-10-1	280 a	33 c	--	170 h	--
Methylcyclohexane	108-87-2	870 a	--	--	--	--
Methylene Chloride	75-09-2	21 a	370 c	5 g	2,200 h	--
Styrene	100-42-5	1700 a	--	100 g	--	--
1,1,2,2-Tetrachloroethane	79-34-5	0.93 a	1400 c	--	610 h	--
Tetrachloroethene	127-18-4	3.4 a	410 c	5 g	98 h	--
Toluene	108-88-3	220 a*	50 c	1,000 g	9.8 h	--
1,2,4-Trichlorobenzene	120-82-1	560 a*	9600 c	70 g	110 h	--
1,1,1-Trichloroethane	71-55-6	690 a*	30 c	200 g	11 h	--
1,1,2-Trichloroethane	79-00-5	1.6 a	1200 c	5 g	1,200 h	--
Trichloroethene	79-01-6	0.11 a	220 c	5 g	47 h	--
Trichlorofluoromethane	75-69-4	130 a*	--	--	--	--
Vinyl Chloride	75-01-4	0.75 a	1722.7 e	2 g	--	--
Xylenes (total)	1330-20-7	90 a*	25 c	10,000 g	1.8 h	--
SVOCs						
Acenaphthene	83-32-9	2,900 a	--	--	520 j	210 l
Acenaphthylene	208-96-8	--	--	--	--	22 l
Acetophenone	98-86-2	--	--	--	--	--
Anthracene	120-12-7	24,000 a*	220 c	--	0.73 h	22 l
Atrazine	1912-24-9	7.8 a	--	3 g	--	--
Benzaldehyde	100-52-7	6,200 a	--	--	--	--
Benzo(a)anthracene	56-55-3	2.1 a	31.7 b	--	0.027 h	4.3 m
Benzo(a)pyrene	50-32-8	0.21 a	31.9 b	0.2 g	0.014 h	0.43 m
Benzo(b)fluoranthene	205-99-2	2.1 a	37 e	--	--	22 l
Benzo(g,h,i)perylene	191-24-2	--	170 f	--	--	22 l
Benzo(k)fluoranthene	207-08-9	21 a	37 e	--	--	22 l
1,1 - Biphenyl	92-52-4	350 a	1,100 c	--	14 h	210 l
bis(2-Chloroethoxy) methane	111-91-1	--	--	--	--	--
bis(2-Chloroethyl)ether	111-44-4	0.55 a	--	--	--	--
Bis(2-Ethylhexyl) phthalate	117-81-7	120 a	890,000 c	6 g	3 h	--
4-Bromophenyl-phenylether	101-55-3	--	1,200 c	--	1.5 h	--

Table 4.0-1: Screening Criteria

Analyte	CAS Number	Soil (mg/kg)	Sediment (ug/kg)	Ground Water (ug/L)	Surface Water (ug/L)	Fish Tissue (ug/kg)
Butylbenzylphthalate	85-68-7	12,000 a*	11,000 c	--	19 h	--
Caprolactam	105-60-2	31,000 a*	--	--	--	--
Carbazole	86-74-8	86 a	--	--	--	--
4-Chloro-3-Methylphenol	59-50-7	--	--	--	--	--
4-Chloroaniline	106-47-8	250 a	--	--	--	--
2-Chloronaphthalene	91-58-7	2,300 a	--	--	--	--
2-Chlorophenol	95-57-8	24 a	--	--	--	5.2 n
4-Chlorophenyl-phenylether	7005-72-3	--	--	--	--	--
Chrysene	218-01-9	210 a	57.1 b	--	--	22 l
Dibenzo(a,h)anthracene	53-70-3	0.21 a	10 e	--	--	0.43 m
Dibenzofuran	132-64-9	310 a	420 c	--	3.7 h	--
3,3'-Dichlorobenzidine	91-94-1	3.8 a	--	--	--	--
2,4-Dichlorophenol	120-83-2	180 a	--	--	365 j	5.2 n
Diethylphthalate	84-66-2	49,000 a*	600 c	--	210 h	--
2,4-Dimethylphenol	105-67-9	1,200 a	29 d	--	--	--
3,4-Dimethylphenol	95-65-8	62 a	--	--	--	--
2,6-Dimethylphenol	576-26-1	37 a	--	--	--	--
Dimethylphthalate	131-11-3	100,000 a	--	--	--	--
Di-n-butylphthalate	84-74-2	6,200 a	11,000 c	--	35 h	--
Di-n-octylphthalate	117-84-0	2,500 a	1.16E+10 e	--	--	--
4,6-Dinitro-2-Methylphenol	534-52-1	--	--	--	--	--
2,4-Dinitrophenol	51-28-5	120 a	--	--	150 j	--
2,4-Dinitrotoluene	121-14-2	120 a	46.9 e	--	230 j	--
2,6-Dinitrotoluene	606-20-2	62 a	100.6 e	--	--	--
Fluoranthene	206-44-0	2,200 a	111 b	--	6.16 k	22 l
Fluorene	86-73-7	2,600 a	540 c	--	3.9 h	540 l
Hexachlorobenzene	118-74-1	1.1 a	20 e	1 g	3.68 j	--
Hexachlorobutadiene	87-68-3	22 a	258.2 e	--	9.3 j	--
Hexachlorocyclopentadiene	77-47-4	370 a	197.8 e	50 g	5.2 j	--
Hexachloroethane	67-72-1	120 a	1,000 c	--	12 h	--
Indeno(1,2,3-cd)pyrene	193-39-5	2.1 a	30 e	--	--	4.3 m
Isophorone	78-59-1	1,800 a	--	--	--	--
2-Methylnaphthalene	91-57-6	--	--	--	--	22 l
2-Methylphenol	95-48-7	3,100 a	12 c	--	13 h	--

Table 4.0-1: Screening Criteria

Analyte	CAS Number	Soil (mg/kg)	Sediment (ug/kg)	Ground Water (ug/L)	Surface Water (ug/L)	Fish Tissue (ug/kg)
4-Methylphenol	106-44-5	310 a	670 d	--	--	--
Naphthalene	91-20-3	19 a	240 c	--	12 h	22 l
2-Nitroaniline	88-74-4	1.8 a	--	--	--	--
3-Nitroaniline	99-09-2	--	--	--	--	--
4-Nitroaniline	100-01-6	--	--	--	--	--
Nitrobenzene	98-95-3	10 a	1285.2 e	--	--	--
2-Nitrophenol	88-75-5	--	--	--	150 j	--
4-Nitrophenol	100-02-7	--	--	--	300 h	--
N-Nitroso-di-n-propylamine	621-64-7	0.25 a	--	--	--	--
N-nitrosodiphenylamine	86-30-6	350 a	--	--	210 h	--
2-2'-oxybis(1-Chloropropane)	108-60-1	7.4 a	--	--	--	--
Pentachlorophenol	87-86-5	9 a	360 d	1 g	15 i	5.2 n
Phenanthrene	85-01-8	--	41.9 b	--	6.3 j	210 l
Phenol	108-95-2	37,000 a*	420 d	--	2,560 j	--
Pyrene	129-00-0	2,900 a	53 b	--	--	22 l
2,3,5,6-Tetrachlorophenol	935-95-5	--	--	--	--	5.2 n
2,4,5-Trichlorophenol	95-95-4	6,200 a	--	--	63 j	5.2 n
2,4,6-Trichlorophenol	88-06-2	6.2 a	--	--	970 j	5.2 n
Inorganics						
Aluminum	7429-90-5	92,000 a*	14,000,000 e	--	87 k	800 l
Antimony	7440-36-0	41 a	64,000 e	6 g	30 h	52 l
Arsenic	7440-38-2	1.6 a	5,900 b	10 g	150 i	2 l
Barium	7440-39-3	6,700 a	20,000 e	2,000 g	4 h	41 l
Beryllium	7440-41-7	1,900 a	--	4 g	0.66 h	--
Cadmium	7440-43-9	45 a	596 b	5 g	0.25 i	4 l
Calcium	7440-70-2	--	--	--	--	--
Chromium	7440-47-3	450 a	37,300 b	100 g	74 i	20 l
Cobalt	7440-48-4	1,900 a	--	--	23 h	4,000 l
Copper	7440-50-8	4,100 a	35,700 b	1,300 g	9 i	500 l
Iron	7439-89-6	31,000 a*	2% f	--	1,000 j	--
Lead	7439-92-1	75 a	35,000 b	15 g	2.5 i	0.8 l
Magnesium	7439-95-4	--	--	--	--	--
Manganese	7439-96-5	1,900 a	460,000 f	--	120 h	2,000 l
Mercury	7439-97-6	31 a	174 b	2 g	1.3 h	--

Table 4.0-1: Screening Criteria

Analyte	CAS Number	Soil (mg/kg)	Sediment (ug/kg)	Ground Water (ug/L)	Surface Water (ug/L)	Fish Tissue (ug/kg)
Nickel	7440-02-0	2,000 a	18,000 b	--	52 i	42 l
Potassium	9/7/7440	--	--	--	--	--
Selenium	7782-49-2	510 a	100 e	50 g	5 i	58 l
Silver	7440-22-4	510 a	4500 e	--	0.36 h	370 l
Sodium	7440-23-5	--	--	--	--	--
Thallium	7440-28-0	6.7 a	--	2 g	12 h	95 m
Vanadium	7440-62-2	720 a	--	--	20 h	210 l
Zinc	7440-66-6	31,000 a*	123,100 b	--	120 i	300 l
Cyanide	57-12-5	1,200 a	100 e	200 g	5.2 i	--
Hexavalent chromium	18540-29-9	64 a	--	--	11 i	--
Dioxins/Furans						
2,3,7,8-TCDD	1746-01-6	1.60E-05 a	0.41 e	3.0E-08 g	<0.00001 j	0.000108 o
2,3,7,8-TCDF	51207-31-9	--	--	--	--	0.00108 o
1,2,3,7,8-PeCDD	40321-76-4	--	--	--	--	0.000108 o
1,2,3,7,8-PeCDF	57117-41-6	--	--	--	--	0.00215 o
2,3,4,7,8-PeCDF	57117-31-4	--	--	--	--	0.000215 o
1,2,3,4,7,8-HxCDD	39227-28-6	--	--	--	--	0.00108 o
1,2,3,6,7,8-HxCDD	57653-85-7	--	--	--	--	0.00108 o
1,2,3,4,7,8-HxCDF	70648-26-9	--	--	--	--	0.00108 o
1,2,3,6,7,8-HxCDF	57117-44-9	--	--	--	--	0.00108 o
2,3,4,6,7,8-HxCDF	60851-34-5	--	--	--	--	0.00108 o
1,2,3,7,8,9-HxCDF	72918-21-9	--	--	--	--	0.00108 o
1,2,3,7,8,9-HxCDD	19408-74-3	--	--	--	--	0.00108 o
1,2,3,4,6,7,8-HpCDF	67562-39-4	--	--	--	--	0.0108 o
1,2,3,4,7,8,9-HpCDF	55673-89-7	--	--	--	--	0.0108 o
1,2,3,4,6,7,8-HpCDD	35822-46-9	--	--	--	--	0.0108 o
OCDD	3268-87-9	--	--	--	--	0.108 o
OCDF	39001-02-0	--	--	--	--	0.108 o
Total TCDD	N/A	--	--	--	--	--
Total PeCDD	N/A	--	--	--	--	--
Total HxCDD	N/A	--	--	--	--	--
Total HpCDD	N/A	--	--	--	--	--
Total TCDF	N/A	--	--	--	--	--
Total PeCDF	N/A	--	--	--	--	--

Table 4.0-1: Screening Criteria

Analyte	CAS Number	Soil (mg/kg)	Sediment (ug/kg)	Ground Water (ug/L)	Surface Water (ug/L)	Fish Tissue (ug/kg)
Total HxCDF	N/A	--	--	--	--	--
Total HpCDF	N/A	--	--	--	--	--
Pesticides/ PCB Aroclors						
α-BHC	319-84-6	0.36 a	120 c	--	2.2 h	--
β-BHC	319-85-7	1.3 a	120 c	--	2.2 h	--
δ-BHC	319-86-8	--	120 c	--	2.2 h	--
γ-BHC (Lindane)	58-89-9	1.7 a	0.94 b	0.2 g	0.08 j	--
Heptachlor	76-44-8	0.38 a	68 c	0.4 g	0.0069 h	--
Aldrin	309-00-2	0.10 a	2 f	--	--	--
Heptachlor epoxide	1024-57-3	0.19 a	0.6 b	0.2 g	0.0038 i	--
Endosulfan I	959-98-8	370 a (2)	5.5 c (2)	--	0.051 h (2)	--
Dieldrin	60-57-1	0.11 a	2.85 b	--	0.056 i	--
4,4′ -DDE	72-55-9	7.0 a	1.42 b	--	--	--
Endrin	72-20-8	18 a	2.67 b	2 g	0.036 i	--
Endosulfan II	33213-65-9	370 a (2)	5.5 c (2)	--	0.051 h (2)	--
4,4′ -DDD	72-54-8	10 a	3.54 b	--	0.011 h	--
Endosulfan sulfate	1031-07-8	--	--	--	--	--
4,4′-DDT	50-29-3	7.0 a	6.98 b	--	0.013 h	--
Methoxychlor	72-43-5	310 a	19 c	40 g	0.019 h	--
Endrin ketone	53494-70-5	--	--	--	--	--
Endrin aldehyde	7421-36-3	--	--	--	--	--
α-Chlordane	5103-71-9	6.5 a (3)	4.5 b (3)	2 g (3)	0.0043 i (3)	--
γ-Chlordane	5103-74-2	6.5 a (3)	4.5 b (3)	2 g (3)	0.0043 i (3)	--
Toxaphene	8001-35-2	1.6 a	--	3 g	0.0002 i	
Aroclor-1016	12674-11-2	21 a	34.1 b	0.5 g	0.014 i	--
Aroclor-1221	11104-28-2	0.74 a	34.1 b	0.5 g	0.28 h	--
Aroclor-1232	11141-16-5	0.74 a	34.1 b	0.5 g	0.58 h	--
Aroclor-1242	53469-21-9	0.74 a	34.1 b	0.5 g	0.053 h	--
Arcolor-1248	12672-29-6	0.74 a	34.1 b	0.5 g	0.081 h	--
Aroclor-1254	11097-69-1	0.74 a	34.1 b	0.5 g	0.033 h	--
Arcolor-1260	11096-82-5	0.74 a	34.1 b	0.5 g	94 h	--

Table 4.0-1 Notes/References:

"--" indicates no screening criteria available.

a - Region IX Preliminary Remediation Goals (PRGs) for Industrial Soil (10/01/02). PRGs with non-cancer endpoints divided by 10 to obtain hazard quotient of 0.1. Values flagged with an asterisk (*) were classified in PRG table as "sat" or "max"; values listed for these compounds were taken from the values in the Region IX Intercalc Table after dividing these values by 10.

b - NOAA Screening Quick Reference Table for Organics and NOAA Screening Quick Reference Table for Inorganics in Solids (Freshwater Sediment TEL). September 1999.

c - Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment - Associated Biota: 1997 Revision (Table 3, Secondary Chronic Value). (Note: The criterion for m-Xylene was used instead of Xylenes to be more conservative).

d - Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment - Associated Biota: 1997 Revision (Table 2. Washington State Sediment Quality Standards).

e - Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volume 1, EPA 1999 (Table E-3, Freshwater Sediment Toxicity Reference Values).

f - Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, Ontario Ministry of the Environment, 1993 (Lowest Effect Levels).

g - Environmental Protection Agency National Primary Drinking Water Standards, 2002.

h - Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision (Tier II Values: Secondary Chronic Value). (Note: The criterion for m-Xylene was used instead of Xylenes to be more conservative).

i - National Recommended Water Quality Criteria for Priority Toxic Pollutants (Freshwater CCC), November 2002.

j - Water Quality Criteria Summary Concentrations, EPA 1994 (Note: The criterion for nitrophenols was used for 2,4 dinitrophenol and 2-nitrophenol since no other criteria existed for these compounds).

k - Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision (NAWQ Criteria; Chronic Value).

l - Lowest Chemical-specific No Observed Adverse Effect Level (NOAEL) for fish, mussel, fish-eating birds or fish-eating mammals from Tables 4-33 and 4-34 in: ICF 2003. Draft Report, Tier III Deterministic Ecological Risk Assessment, U.S. Army Solider System Center (SSC), Natick, MA.

m - EPA Region 3 fish risk-based concentration for human health risk.

n - ESAT, 2003. Proposed Project Action Limits (PALs), Practical Quantitation Limits (PQLs), and Method Detection Limits (MDLs) for Contaminants in Fish Tissue to be Collected from the Rumford River at the Hatheway & Patterson Superfund Site, Mansfield, MA. June 26, 2003.

o - 10^{-5} human cancer risk associated with 6.5g/day fish consumption.

(1) - Represents screening criteria for 1,3-dichloropropene.

(2) - Represents screening criteria for endosulfan.

(3) - Represents screening criteria for chlordane.

Table 4.1-1: Pentachlorophenol Screening Results, November 2002

Sample ID	Depth (feet)	PCP (mg/kg)
SURFACE SOIL		
SS-21a	0-0.5	<0.1
SS-21b	0-1	<0.1
SS-22a	0-0.5	<0.1
SS-22b	0-1	<0.1
SS-23a	0-0.5	<0.1
SS-23b	0-1	<0.1
SS-24a	0-0.5	<0.1
SS-24b	0-1	<0.1
SS-25a	0-0.5	0.42
SS-25b	0-1	0.23
SUBSURFACE SOIL		
SB-001	1-4	7.34
SB-001	4-10	4.99
SB-002	1-4	<0.1
SB-002	4-10	0.02J
SB-003	1-4	5
SB-003	4-10	2.7
SB-004	1-4	<0.1
SB-004	4-10	<0.1
SB-005	1-4	0.03J
SB-005	4-10	<0.1
SB-006	1-4	<0.1
SB-006	4-10	<0.1
SB-007	1-4	<0.1
SB-007	4-10	<0.1
SB-008	1-4	<0.1
SB-008	4-10	<0.1
SB-009	1-4	0.04J
SB-009	4-10	<0.1
SB-010	1-4	3.16
SB-010	4-10	2894 (HI)
SB-011	1-4	0.08J
SB-011	4-10	<0.1
SB-012	1-4	1.63
SB-012	4-10	165.7 (HI)

Notes:
(1) HI indicates concentration detected out of instrument range.
(2) J indicates detected, but below instrument detection level.

Table 4.1-2: XRF Metals Screening Results, November 2002

Sample ID	Depth (feet)	Arsenic (mg/kg)		Copper (mg/kg)		Chromium (mg/kg)		Lead (mg/kg)	
SURFACE SOIL									
SS-27b	0-1	**17.4**	**±11**	ND	<39	ND	<210	**23.9**	**±12**
SS-28a	0-0.5	**158**	**±21**	**86**	**±26**	**300**	**±140**	**411**	**±23**
SS-28b	0-1	**200**	**±24**	**182**	**±32**	**378**	**±160**	**494**	**±27**
SS-29a	0-0.5	**87.1**	**±9.8**	**139**	**±27**	ND	<130	**257**	**±11**
SS-29b	0-1	**95**	**±14**	**126**	**±18**	ND	<140	**604**	**±17**
SS-30b	0-1	ND	<30	**78.9**	**±35**	ND	<270	**243**	**±25**
SS-31b	0-1	**24.5**	**±12**	**51.3**	**±19**	**154**	**±100**	**246**	**±14**
SS-32b	0-1	**462**	**±23**	**498**	**±38**	**695**	**±160**	**389**	**±21**
SS-34a	0-0.5	**56**	**±14**	**184**	**±14**	ND	<130	**1710**	**±19**
SS-34b	0-1	**27**	**±14**	**93.7**	**±21**	ND	<190	**732**	**±23**
SS-35b	0-1	ND	<19	**58.7**	**±30**	ND	<250	**62.8**	**±16**
SS-36b	0-1	**60.8**	**±11**	**223**	**±19**	ND	<160	**372**	**±13**
SS-39a	0-0.5	**22.5**	**±14**	**51.9**	**±26**	ND	<250	**127**	**±16**
SS-39b	0-1	ND	<18	**46.7**	**±24**	ND	<220	**110**	**±14**
SS-43a	0-0.5	**76.3**	**±16**	**69.3**	**±39**	ND	<370	ND	<22
SS-43b	0-1	**38.7**	**±9.8**	ND	<36	ND	<240	ND	<16
SS-46b	0-1	ND	<17	ND	<45	ND	<240	**30.4**	**±14**
SS-47b	0-1	ND	<18	ND	<42	ND	<250	**39.2**	**±14**
SS-48b	0-1	ND	<23	ND	<50	ND	<300	**65.3**	**±19**
SS-49b	0-1	ND	<20	ND	<45	ND	<240	**45.2**	**±15**
SS-50b	0-1	ND	<16	ND	<40	ND	<220	**44.9**	**±13**
SS-51b	0-1	ND	<17	ND	<44	**255**	**±160**	**30.5**	**±14**
SS-52a	0-0.5	ND	<19	ND	<44	ND	<250	**37.6**	**±15**
SS-52b	0-1	ND	<17	ND	<45	ND	<250	**26.5**	**±14**
SS-53b	0-1	ND	<18	ND	<40	ND	<260	**39.2**	**±15**
SS-54a	0-0.5	ND	<14	ND	<33	ND	<160	ND	<16
SS-54b	0-1	ND	<13	ND	<34	ND	<160	**130**	**±19**
SS-55b	0-1	ND	< 19	ND	<37	ND	<210	**104**	**±16**
SS-56a	0-0.5	**15.4**	**±6.8**	**26**	**±13**	ND	<110	**110**	**±8.2**
SS-56b	0-1	ND	< 19	ND	<43	ND	<220	**52.1**	**±15**
SS-57b	0-1	ND	<19	ND	<41	ND	<210	**40.5**	**±15**

Table 4.1-2: XRF Metals Screening Results, November 2002

Sample ID	Depth (feet)	Arsenic (mg/kg)		Copper (mg/kg)		Chromium (mg/kg)		Lead (mg/kg)	
SUBSURFACE SOIL									
SB-001	1-4	ND	< 20	ND	< 65	ND	< 310	**25.1**	**±16**
SB-001	4-10	ND	< 20	ND	< 51	ND	< 310	ND	< 23
SB-002	1-4	**46.7**	**±24**	**108**	**±37**	ND	< 340	**340**	**±29**
SB-002	4-10	ND	< 20	ND	< 51	ND	< 330	**33.2**	**±16**
SB-003	1-4	**39**	**±22**	**92.1**	**±39**	ND	< 340	**236**	**±27**
SBE-003	1-4	ND	< 33	ND	< 53	ND	< 330	**269**	**±27**
SB-003	4-10	ND	< 20	ND	< 53	ND	< 280	**24.1**	**±16**
SB-004	1-4	ND	< 27	**137**	**±41**	ND	< 340	**133**	**±22**
SB-004	4-10	ND	< 20	ND	< 48	ND	< 280	**46.7**	**±16**
SB-005	1-4	ND	< 17	ND	< 46	ND	< 250	ND	< 20
SB-005	4-10	ND	< 19	ND	< 49	ND	< 300	ND	< 22
SB-006	1-4	ND	< 38	**197**	**±66**	ND	< 360	**409**	**±32**
SB-006	4-10	ND	< 17	ND	< 51	ND	< 280	ND	< 22
SB-007	1-4	ND	< 21	ND	< 49	ND	< 280	**45.3**	**±17**
SB-007	4-10	ND	< 22	ND	< 47	ND	< 280	**85.1**	**±18**
SB-008	1-4	ND	< 51	**256**	**±45**	ND	< 370	**908**	**±45**
SB-008	4-10	ND	< 19	ND	< 51	ND	< 300	ND	< 22
SB-009	1-4	ND	< 23	ND	< 50	ND	< 300	**80.2**	**±18**
SB-009	4-10	ND	< 20	ND	< 49	**325**	**±210**	**21.1**	**±17**
SB-010	1-4	**70.5**	**±13**	ND	< 41	ND	< 280	**45.3**	**±14**
SB-010	4-10	ND	< 18	ND	< 51	ND	< 300	ND	< 22
SB-011	1-4	ND	< 14	ND	< 37	ND	< 210	**24.6**	**±11**
SB-011	4-10	ND	< 16	ND	< 42	ND	< 250	ND	< 19
SB-012	1-4	**20.2**	**±13**	ND	< 54	ND	< 340	ND	< 22
SB-012	4-10	ND	< 19	ND	< 47	ND	< 280	ND	< 22

Table 4.1-3
Detected Concentrations in Surface Soil

			EPA-2	EPA-3	EPA-4	EPA-5	EPA-6	EPA-7	EPA-8	EPA-9	EPA-10	EPA-12	HP1-D5	HP1-J5	HP1-M5	HP2-A
			EPA-2	EPA-3	EPA-4	EPA-5	EPA-6	EPA-7	EPA-8	EPA-9	EPA-10	EPA-12				
		EPA Region IX	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	9/30/1994	9/30/1994	9/30/1994	9/30/1994
		PRG for	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.5	0-0.5	0-0.5	0-0.5
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																
Benzene	(ug/kg)	1300														
Toluene	(ug/kg)	220000														
Xylenes (total)	(ug/kg)	90000														
SVOCs																
Benzaldehyde	(ug/kg)	6200000														
Phenol	(ug/kg)	37000000														
2-Chlorophenol	(ug/kg)	24000														
2-Methylphenol	(ug/kg)	3100000														
Acetophenone	(ug/kg)															
4-Methylphenol	(ug/kg)	310000														
2-Nitrophenol	(ug/kg)															
2,4-Dimethylphenol	(ug/kg)	1200000														
2,4-Dichlorophenol	(ug/kg)	180000														
Naphthalene	(ug/kg)	19000														
4-Chloro-3-methylphenol	(ug/kg)															
2-Methylnaphthalene	(ug/kg)															
2,4,6-Trichlorophenol	(ug/kg)	6200														
2,4,5-Trichlorophenol	(ug/kg)	6200000														
Biphenyl	(ug/kg)	350000														
Acenaphthylene	(ug/kg)															
Acenaphthene	(ug/kg)	2900000														
2,4-Dinitrophenol	(ug/kg)	120000														
4-Nitrophenol	(ug/kg)															
Dibenzofuran	(ug/kg)	310000														
Fluorene	(ug/kg)	2600000														
4,6-Dinitro-2-methylphenol	(ug/kg)															
Pentachlorophenol	(ug/kg)	9000														
Phenanthrene	(ug/kg)															
Anthracene	(ug/kg)	24000000														
Carbazole	(ug/kg)	86000														
Fluoranthene	(ug/kg)	2200000														
Pyrene	(ug/kg)	2900000														
Benzo(a)anthracene	(ug/kg)	2100														
Chrysene	(ug/kg)	210000														
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000														
Benzo(b)fluoranthene	(ug/kg)	2100														
Benzo(k)fluoranthene	(ug/kg)	21000														
Benzo(a)pyrene	(ug/kg)	210														
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100														
Dibenz(a,h) anthracene	(ug/kg)	210														
Benzo(g,h,i)perylene	(ug/kg)															
Metals																
Aluminum	(mg/kg)	92000	5300	4500	4100	3500	4800	5200	4300	6100	4000	7500	6800	5800	3400	8000
Antimony	(mg/kg)	41														
Arsenic	(mg/kg)	1.6	[420]	[33]		[36]		[53]		[21]		[33]	[94]	[26]	[630]	[300]
Barium	(mg/kg)	6700	38	25	28	27	37	43	22	42	47	46	12	24	35	49
Beryllium	(mg/kg)	1900											0.35	0.48	0.43	0.58
Cadmium	(mg/kg)	45														
Calcium	(mg/kg)		1300	800	790	900	2100	1700	820	2300	1700	1200	790	1700	1100	4000
Chromium(total)	(mg/kg)	450	[660]	67	45	55	24	92	29	30	24	45	120	38	180	[460]
Cobalt	(mg/kg)	1900	4.2	3.7	3.6	3.2	3.9	5.1	3.6	4	3.2	4	1.1	1.2		
Copper	(mg/kg)	4100	280	46	27	37	26	68	22	28	31	44	72	44	240	270
Iron	(mg/kg)	31000	14000	11000	13000	10000	11000	17000	9600	11000	8500	11000	11000	19000	[32000]	21000
Lead	(mg/kg)	75	[210]	[92]	[110]	[190]	43	[240]	[92]	[110]	[180]	[180]	10	[79]	[220]	[130]
Magnesium	(mg/kg)		1500	1200	1200	1200	1800	1800	1500	1400	1300	1400	1700	2700	1200	2300
Manganese	(mg/kg)	1900	200	170	200	200	210	330	200	210	190	350	150	300	210	330
Mercury	(mg/kg)	31														

Table 4.1-3
Detected Concentrations in Surface Soil

			EPA-2	EPA-3	EPA-4	EPA-5	EPA-6	EPA-7	EPA-8	EPA-9	EPA-10	EPA-12	HP1-D5	HP1-J5	HP1-M5	HP2-A
			EPA-2	EPA-3	EPA-4	EPA-5	EPA-6	EPA-7	EPA-8	EPA-9	EPA-10	EPA-12				
		EPA Region IX	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	4/29/2003	9/30/1994	9/30/1994	9/30/1994	9/30/1994
		PRG for	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.17	0-0.5	0-0.5	0-0.5	0-0.5
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Nickel	(mg/kg)	2000	8	6	7.3		8.4	9.8	6.9	6.8		7.5	5.2	9.7	10	12
Potassium	(mg/kg)												220	500	300	660
Selenium	(mg/kg)	510														
Silver	(mg/kg)	510														
Sodium	(mg/kg)												28	48	48	83
Thallium	(mg/kg)	6.7											[12]	[43]	[82]	[35]
Vanadium	(mg/kg)	720	18	14	16	15	13	19	15	16	13	19	13	6.3	9.6	13
Zinc	(mg/kg)	31000	65	57	92	63	82	110	48	81	80	160	20	38	57	170
Dioxin																
2,3,7,8-TCDD	(ng/kg)	16														
1,2,3,7,8-PeCDD	(ng/kg)															
1,2,3,4,7,8-HxCDD	(ng/kg)															
1,2,3,6,7,8-HxCDD	(ng/kg)															
1,2,3,7,8,9-HxCDD	(ng/kg)															
1,2,3,4,6,7,8-HpCDD	(ng/kg)															
OCDD	(ng/kg)															
2,3,7,8-TCDF	(ng/kg)															
1,2,3,7,8-PeCDF	(ng/kg)															
2,3,4,7,8-PeCDF	(ng/kg)															
1,2,3,4,7,8-HxCDF	(ng/kg)															
1,2,3,6,7,8-HxCDF	(ng/kg)															
2,3,4,6,7,8-HxCDF	(ng/kg)															
1,2,3,7,8,9-HxCDF	(ng/kg)															
1,2,3,4,6,7,8-HpCDF	(ng/kg)															
1,2,3,4,7,8,9-HpCDF	(ng/kg)															
OCDF	(ng/kg)															
TCDDs (total)	(ng/kg)															
PeCDDs (total)	(ng/kg)															
HxCDDs (Total)	(ng/kg)															
HpCDDs (total)	(ng/kg)															
TCDFs (total)	(ng/kg)															
PeCDFs (total)	(ng/kg)															
HxCDFs (total)	(ng/kg)															
HpCDFs (total)	(ng/kg)															
TEQ EMPC (ND=0) 1989	(ng/kg)	16														
TEQ EMPC (ND=0) 1998	(ng/kg)	16														

Table 4.1-3
Detected Concentrations in Surface Soil

			HP3-B5	HP3-C5	HP3-D5	HP4-A	HP4-B	HP4-D	HP4-E	HP4-F	HP4-G	HP4-H	HP5-E	HP5-K	MW-010	MW-011	SS-001
																	D03482
		EPA Region IX	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	1/17/1989	1/13/1989	11/11/2002
		PRG for	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-2	0-2	0-1
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																	
Benzene	(ug/kg)	1300													36.2	33	
Toluene	(ug/kg)	220000													30.4		
Xylenes (total)	(ug/kg)	90000													30		
SVOCs																	
Benzaldehyde	(ug/kg)	6200000															
Phenol	(ug/kg)	37000000															
2-Chlorophenol	(ug/kg)	24000															
2-Methylphenol	(ug/kg)	3100000															
Acetophenone	(ug/kg)																
4-Methylphenol	(ug/kg)	310000															
2-Nitrophenol	(ug/kg)																
2,4-Dimethylphenol	(ug/kg)	1200000													180	400	
2,4-Dichlorophenol	(ug/kg)	180000													1100	810	
Naphthalene	(ug/kg)	19000					9600										
4-Chloro-3-methylphenol	(ug/kg)																
2-Methylnaphthalene	(ug/kg)																
2,4,6-Trichlorophenol	(ug/kg)	6200															
2,4,5-Trichlorophenol	(ug/kg)	6200000															
Biphenyl	(ug/kg)	350000															
Acenaphthylene	(ug/kg)			1900													
Acenaphthene	(ug/kg)	2900000															
2,4-Dinitrophenol	(ug/kg)	120000															
4-Nitrophenol	(ug/kg)																
Dibenzofuran	(ug/kg)	310000															
Fluorene	(ug/kg)	2600000															
4,6-Dinitro-2-methylphenol	(ug/kg)																
Pentachlorophenol	(ug/kg)	9000	[61000]	[46000]	[86000]	[79000]	[3200000]	[3200000]	[550000]			[4900000]			100		
Phenanthrene	(ug/kg)			3500													
Anthracene	(ug/kg)	24000000		1400													
Carbazole	(ug/kg)	86000															
Fluoranthene	(ug/kg)	2200000		1400													
Pyrene	(ug/kg)	2900000		3900			7300	9800									
Benzo(a)anthracene	(ug/kg)	2100		1600													
Chrysene	(ug/kg)	210000		2300								1300					
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000															
Benzo(b)fluoranthene	(ug/kg)	2100		[2300]								1200					
Benzo(k)fluoranthene	(ug/kg)	21000		2000													
Benzo(a)pyrene	(ug/kg)	210		[1800]													
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100		1300													
Dibenz(a,h) anthracene	(ug/kg)	210															
Benzo(g,h,i)perylene	(ug/kg)			1300													
Metals																	
Aluminum	(mg/kg)	92000	4100		4100					6500	6700		2700	6500			
Antimony	(mg/kg)	41															
Arsenic	(mg/kg)	1.6	[1200]		[1200]					[400]	[1200]		[160]	[8.7]	[2.3]	[5]	
Barium	(mg/kg)	6700	52		32					41	20		33	19			
Beryllium	(mg/kg)	1900	0.44		0.38					0.44	0.62		0.28	0.43			
Cadmium	(mg/kg)	45															
Calcium	(mg/kg)		1400		1100					13000	800		430	530			
Chromium(total)	(mg/kg)	450	[1800]		[1400]					[600]	[950]		[470]	15	19.4	10.3	
Cobalt	(mg/kg)	1900															
Copper	(mg/kg)	4100	800		700					160	230		86	10	21.3	14.1	
Iron	(mg/kg)	31000	28000		22000					15000	20000		26000	16000			
Lead	(mg/kg)	75	[220]		[110]					[75]	74		17	9.5			
Magnesium	(mg/kg)		1300		1600					1800	2300		1000	1600			
Manganese	(mg/kg)	1900	210		200					220	220		120	130			
Mercury	(mg/kg)	31															

Table 4.1-3
Detected Concentrations in Surface Soil

			HP3-B5	HP3-C5	HP3-D5	HP4-A	HP4-B	HP4-D	HP4-E	HP4-F	HP4-G	HP4-H	HP5-E	HP5-K	MW-010	MW-011	SS-001
																	D03482
		EPA Region IX	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	9/30/1994	1/17/1989	1/13/1989	11/11/2002
		PRG for	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-2	0-2	0-1
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Nickel	(mg/kg)	2000	9.9		9.1					7.9	10		3	5.5			
Potassium	(mg/kg)		360		270					280	440		380	270			
Selenium	(mg/kg)	510											8.8				
Silver	(mg/kg)	510															
Sodium	(mg/kg)		48		51					68	29		130	36			
Thallium	(mg/kg)	6.7	[67]		[49]					[23]	[39]		[68]	[24]			
Vanadium	(mg/kg)	720	5		4.1					12	8.4		8.7	15			
Zinc	(mg/kg)	31000	110		120					230	47		17	24			
Dioxin																	
2,3,7,8-TCDD	(ng/kg)	16															
1,2,3,7,8-PeCDD	(ng/kg)																27.5
1,2,3,4,7,8-HxCDD	(ng/kg)																160
1,2,3,6,7,8-HxCDD	(ng/kg)																1610
1,2,3,7,8,9-HxCDD	(ng/kg)																614
1,2,3,4,6,7,8-HpCDD	(ng/kg)																47500
OCDD	(ng/kg)																475000J
2,3,7,8-TCDF	(ng/kg)																1.76
1,2,3,7,8-PeCDF	(ng/kg)																5.79
2,3,4,7,8-PeCDF	(ng/kg)																5.91
1,2,3,4,7,8-HxCDF	(ng/kg)																172
1,2,3,6,7,8-HxCDF	(ng/kg)																106J
2,3,4,6,7,8-HxCDF	(ng/kg)																61.8J
1,2,3,7,8,9-HxCDF	(ng/kg)																21.7J
1,2,3,4,6,7,8-HpCDF	(ng/kg)																11300J
1,2,3,4,7,8,9-HpCDF	(ng/kg)																705J
OCDF	(ng/kg)																71500
TCDDs (total)	(ng/kg)																23.2J
PeCDDs (total)	(ng/kg)																139J
HxCDDs (Total)	(ng/kg)																10000J
HpCDDs (total)	(ng/kg)																181000J
TCDFs (total)	(ng/kg)																101JEB
PeCDFs (total)	(ng/kg)																482J
HxCDFs (total)	(ng/kg)																18300J
HpCDFs (total)	(ng/kg)																130000J
TEQ EMPC (ND=0) 1989	(ng/kg)	16															[1400]J
TEQ EMPC (ND=0) 1998	(ng/kg)	16															[960]J

Table 4.1-3
Detected Concentrations in Surface Soil

			SS-002	SS-003	SS-004	SS-005	SS-006	SS-007	SS-008	SS-009	SS-010	SS-011	SS-012	SS-013	SS-014	SS-015
			D03484	D03485	D03486	D03488	D03489	D03490	D03491	D03493	D03494	D03495	D03496	D03498	D03499	D03500
		EPA Region IX	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/12/2002	11/12/2002	11/12/2002	11/12/2002	11/12/2002
		PRG for	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																
Benzene	(ug/kg)	1300														
Toluene	(ug/kg)	220000														
Xylenes (total)	(ug/kg)	90000														
SVOCs																
Benzaldehyde	(ug/kg)	6200000														
Phenol	(ug/kg)	37000000														
2-Chlorophenol	(ug/kg)	24000														
2-Methylphenol	(ug/kg)	3100000														
Acetophenone	(ug/kg)															
4-Methylphenol	(ug/kg)	310000														
2-Nitrophenol	(ug/kg)															
2,4-Dimethylphenol	(ug/kg)	1200000														
2,4-Dichlorophenol	(ug/kg)	180000														
Naphthalene	(ug/kg)	19000														
4-Chloro-3-methylphenol	(ug/kg)															
2-Methylnaphthalene	(ug/kg)															
2,4,6-Trichlorophenol	(ug/kg)	6200														
2,4,5-Trichlorophenol	(ug/kg)	6200000														
Biphenyl	(ug/kg)	350000														
Acenaphthylene	(ug/kg)															
Acenaphthene	(ug/kg)	2900000														
2,4-Dinitrophenol	(ug/kg)	120000														
4-Nitrophenol	(ug/kg)															
Dibenzofuran	(ug/kg)	310000														
Fluorene	(ug/kg)	2600000														
4,6-Dinitro-2-methylphenol	(ug/kg)															
Pentachlorophenol	(ug/kg)	9000														
Phenanthrene	(ug/kg)															
Anthracene	(ug/kg)	24000000														
Carbazole	(ug/kg)	86000														
Fluoranthene	(ug/kg)	2200000														
Pyrene	(ug/kg)	2900000														
Benzo(a)anthracene	(ug/kg)	2100														
Chrysene	(ug/kg)	210000														
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000														
Benzo(b)fluoranthene	(ug/kg)	2100														
Benzo(k)fluoranthene	(ug/kg)	21000														
Benzo(a)pyrene	(ug/kg)	210														
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100														
Dibenz(a,h) anthracene	(ug/kg)	210														
Benzo(g,h,i)perylene	(ug/kg)															
Metals																
Aluminum	(mg/kg)	92000														
Antimony	(mg/kg)	41														
Arsenic	(mg/kg)	1.6														
Barium	(mg/kg)	6700														
Beryllium	(mg/kg)	1900														
Cadmium	(mg/kg)	45														
Calcium	(mg/kg)															
Chromium(total)	(mg/kg)	450														
Cobalt	(mg/kg)	1900														
Copper	(mg/kg)	4100														
Iron	(mg/kg)	31000														
Lead	(mg/kg)	75														
Magnesium	(mg/kg)															
Manganese	(mg/kg)	1900														
Mercury	(mg/kg)	31														

Table 4.1-3
Detected Concentrations in Surface Soil

			SS-002	SS-003	SS-004	SS-005	SS-006	SS-007	SS-008	SS-009	SS-010	SS-011	SS-012	SS-013	SS-014	SS-015
			D03484	D03485	D03486	D03488	D03489	D03490	D03491	D03493	D03494	D03495	D03496	D03498	D03499	D03500
		EPA Region IX	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/11/2002	11/12/2002	11/12/2002	11/12/2002	11/12/2002	11/12/2002
		PRG for	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Nickel	(mg/kg)	2000														
Potassium	(mg/kg)															
Selenium	(mg/kg)	510														
Silver	(mg/kg)	510														
Sodium	(mg/kg)															
Thallium	(mg/kg)	6.7														
Vanadium	(mg/kg)	720														
Zinc	(mg/kg)	31000														
Dioxin																
2,3,7,8-TCDD	(ng/kg)	16		8.68*	1.68	12.1J	2.81									
1,2,3,7,8-PeCDD	(ng/kg)		16.2	233	47.3	410	40.6		5.54		4.04		5.1			5.22
1,2,3,4,7,8-HxCDD	(ng/kg)		49.7	674	156	1800	76.7		13.3		8.39		7.5			11.3
1,2,3,6,7,8-HxCDD	(ng/kg)		177	3480	516	15100	445	9.01	48.9	5.88	29.8		23.7	7.81		75.5
1,2,3,7,8,9-HxCDD	(ng/kg)		131	1700	385	6950	239	6.22	32.8		17.2		16.8	5.81		29.4
1,2,3,4,6,7,8-HpCDD	(ng/kg)		3850	94500	7980	683000J	11700	719	1660	142	824	65.9	547	285	70.3	1760
OCDD	(ng/kg)		31300J	1.33E+06J	85600	4.13E+06J	109000J	8880J	15400	1390	7330J	531	3810J	3120J	572	12900
2,3,7,8-TCDF	(ng/kg)				0.843J		1.81		0.749J		0.936J					0.678J
1,2,3,7,8-PeCDF	(ng/kg)		1	27.9	4.92	54.1	8.43	0.834J	2.88		2.21		2.02			2.73
2,3,4,7,8-PeCDF	(ng/kg)		2.12	31.2	5.6	52.7			2.58		2.29		2.5			2.27
1,2,3,4,7,8-HxCDF	(ng/kg)		68	761	85.2	2190	137	3.59	20.1		14.8		15.4	4.38		63.5
1,2,3,6,7,8-HxCDF	(ng/kg)		189J	1060	96.8J	981	375J		15.5J	3.95J	15.9J	4.76J	20.2J	16.7J		61.8J
2,3,4,6,7,8-HxCDF	(ng/kg)			291	55.4J	779	71.8J		10.1J		6.77J		4.74J			19.2J
1,2,3,7,8,9-HxCDF	(ng/kg)			10.4*		36.9J										
1,2,3,4,6,7,8-HpCDF	(ng/kg)		942J	11900	1310J	61900	1720J	54.2	292	25.3	189	24.4	124	85.8	22.2	1040
1,2,3,4,7,8,9-HpCDF	(ng/kg)		147J	1560	342J	9950	252J	7.74J	39.3J		19.1J		16J	10.8J		163J
OCDF	(ng/kg)		4760	38900J	5520	290000	4370	339	868	84.1	597	79.1	262	235	58.4	4230
TCDDs (total)	(ng/kg)		11.4J	5.79J	34.3J	12.1J	32.5J	1.22J	5.31J	0.375J	6.56J		0.532J	0.511J	0.454J	53J
PeCDDs (total)	(ng/kg)		73J	551J	144J	1030J	125J		19.3J		16.9J		10.1J		4.96J	50.3J
HxCDDs (Total)	(ng/kg)		914J	13200J	2260J	58600J	2040J	40J	242J	23.7J	142J	7.93J	106J	41.6J	19.9J	307J
HpCDDs (total)	(ng/kg)		8360J	179000J	17600J	1.12E+06J	21300J	1100J	2800J	234J	1370J	112J	853J	502J	125J	3070J
TCDFs (total)	(ng/kg)		141JEB	1640J	132JEB	2340J	581JEB	9.61JEB	28.2JEB	8.4JEB	45.5JEB	6.38JEB	33.1JEB	15.3JEB	13.9JEB	87.7JEB
PeCDFs (total)	(ng/kg)		1030J	4430J	413J	2890J	2390J	10.6J	72J	25.7J	83J	24.7J	119J	86.5J	29.8J	126J
HxCDFs (total)	(ng/kg)		5220J	37000J	4070J	85200J	7030J	42.5J	461J	81J	322J	68.1J	403J	290J	57.7J	1660J
HpCDFs (total)	(ng/kg)		8850J	85000J	13400J	506000J	8150J	248J	1250J	95.5J	722J	84.6J	456J	319J	76.1J	6260J
TEQ EMPC (ND=0) 1989	(ng/kg)	16	[160]J	[3400]J	[340]J	[15000]J	[410]J	[19]J	[54]J	4.1J	[31]J	2J	[24]J	11J	1.6J	[77]J
TEQ EMPC (ND=0) 1998	(ng/kg)	16	[130]J	[2300]J	[290]J	[11000]J	[330]J	11J	[43]J	2.8J	[26]J	1.4J	[22]J	7J	0.99J	[64]J

Table 4.1-3
Detected Concentrations in Surface Soil

CONSTITUENT	UNITS	EPA Region IX PRG for Industrial Soil	SS-015 D03646 11/19/2002 0-1 Primary	SS-016 D03501 11/12/2002 0-1 Primary	SS-016 D03530 11/12/2002 0-1 Duplicate 1	SS-016 D03643 11/19/2002 0-1 Primary	SS-016 D03644 11/19/2002 0-1 Duplicate 1	SS-017 D03502 11/12/2002 0-1 Primary	SS-018 D03503 11/12/2002 0-1 Primary	SS-018 D03647 11/19/2002 0-1 Primary	SS-019 D03504 11/12/2002 0-1 Primary	SS-020 D03506 11/12/2002 0-1 Primary	SS-021 D03507 11/11/2002 0-1 Primary	SS-022 D03508 11/11/2002 0-1 Primary	SS-025 D03510 11/12/2002 0-1 Primary	SS-026 MAJF67 11/11/2002 0-1 Primary
VOCs																
Benzene	(ug/kg)	1300														
Toluene	(ug/kg)	220000														
Xylenes (total)	(ug/kg)	90000														
SVOCs																
Benzaldehyde	(ug/kg)	6200000	320B			260B	300B			75JB						
Phenol	(ug/kg)	37000000														
2-Chlorophenol	(ug/kg)	24000														
2-Methylphenol	(ug/kg)	3100000														
Acetophenone	(ug/kg)		100J				60J						120			
4-Methylphenol	(ug/kg)	310000												50EB		
2-Nitrophenol	(ug/kg)															
2,4-Dimethylphenol	(ug/kg)	1200000														
2,4-Dichlorophenol	(ug/kg)	180000														
Naphthalene	(ug/kg)	19000	930			330	300						140	1100	66J	
4-Chloro-3-methylphenol	(ug/kg)															
2-Methylnaphthalene	(ug/kg)		710			330	300						160	440	77J	
2,4,6-Trichlorophenol	(ug/kg)	6200														
2,4,5-Trichlorophenol	(ug/kg)	6200000														
Biphenyl	(ug/kg)	350000	94J			74J	70J							120		
Acenaphthylene	(ug/kg)		59J										63J	690	48J	
Acenaphthene	(ug/kg)	2900000	57J											66J	180	
2,4-Dinitrophenol	(ug/kg)	120000														
4-Nitrophenol	(ug/kg)															
Dibenzofuran	(ug/kg)	310000	160			110J	100J						52J	340	95J	
Fluorene	(ug/kg)	2600000												62J	190	
4,6-Dinitro-2-methylphenol	(ug/kg)															
Pentachlorophenol	(ug/kg)	9000	74J			2500	1800			93J			58J		340J	
Phenanthrene	(ug/kg)		680			500	420						210	1200	2400	
Anthracene	(ug/kg)	24000000				66J								460	790	
Carbazole	(ug/kg)	86000												410	390	
Fluoranthene	(ug/kg)	2200000	610			470	380						210	3800	4500	
Pyrene	(ug/kg)	2900000	510			380	310						170	3100	3600	
Benzo(a)anthracene	(ug/kg)	2100	280			200	160						95J	1800	1800	
Chrysene	(ug/kg)	210000	520			420	370						220	2400	1900	
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000					63J			61J			700J			
Benzo(b)fluoranthene	(ug/kg)	2100	370			290	250						180	[3300]	1400	
Benzo(k)fluoranthene	(ug/kg)	21000	300			240	180						150	2200	1200	
Benzo(a)pyrene	(ug/kg)	210	[240]			170	130						99J	[2000]	[1200]	
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100	89J			88J	70J						130	960	530	
Dibenz(a,h) anthracene	(ug/kg)	210												[270]	160	
Benzo(g,h,i)perylene	(ug/kg)		88J			76J	66J						99J	580	400	
Metals																
Aluminum	(mg/kg)	92000														4640
Antimony	(mg/kg)	41														2.1JEB
Arsenic	(mg/kg)	1.6														[10.4]
Barium	(mg/kg)	6700														27.2
Beryllium	(mg/kg)	1900														
Cadmium	(mg/kg)	45														
Calcium	(mg/kg)															1350J
Chromium(total)	(mg/kg)	450														14.5
Cobalt	(mg/kg)	1900														4
Copper	(mg/kg)	4100														48.4
Iron	(mg/kg)	31000														14200
Lead	(mg/kg)	75														[98.9]
Magnesium	(mg/kg)															1900
Manganese	(mg/kg)	1900														235
Mercury	(mg/kg)	31														0.15

Table 4.1-3

Detected Concentrations in Surface Soil

			SS-015	SS-016	SS-016	SS-016	SS-016	SS-017	SS-018	SS-018	SS-019	SS-020	SS-021	SS-022	SS-025	SS-026
			D03646	D03501	D03530	D03643	D03644	D03502	D03503	D03647	D03504	D03506	D03507	D03508	D03510	MAJF67
		EPA Region IX	11/19/2002	11/12/2002	11/12/2002	11/19/2002	11/19/2002	11/12/2002	11/12/2002	11/19/2002	11/12/2002	11/12/2002	11/11/2002	11/11/2002	11/12/2002	11/11/2002
		PRG for	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Nickel	(mg/kg)	2000														6.7
Potassium	(mg/kg)															272J
Selenium	(mg/kg)	510														
Silver	(mg/kg)	510														
Sodium	(mg/kg)															
Thallium	(mg/kg)	6.7														
Vanadium	(mg/kg)	720														12.9
Zinc	(mg/kg)	31000														81.7
Dioxin																
2,3,7,8-TCDD	(ng/kg)	16		6.18	7.17							2.9J				
1,2,3,7,8-PeCDD	(ng/kg)			50.4	61.3				3.85		2.2	14.5J				
1,2,3,4,7,8-HxCDD	(ng/kg)			104	116				10.5		6	24.1J				
1,2,3,6,7,8-HxCDD	(ng/kg)			884	685			8.33	35.3		23.6	93.3J				
1,2,3,7,8,9-HxCDD	(ng/kg)			383	403				23.6		14.3J	73.3J				
1,2,3,4,6,7,8-HpCDD	(ng/kg)			35000	23200J			172	870		899J	1870J				
OCDD	(ng/kg)			304000J	187000J			1230	6300J		9850J	21700J				
2,3,7,8-TCDF	(ng/kg)			1.71J	1.97			1.14				5.12J				
1,2,3,7,8-PeCDF	(ng/kg)			13.9	12.5			0.87J	1.49		0.915J	5.7J				
2,3,4,7,8-PeCDF	(ng/kg)			12.7	15.4J							12.5J				
1,2,3,4,7,8-HxCDF	(ng/kg)			304	352				18.3		10.9	40.9J				
1,2,3,6,7,8-HxCDF	(ng/kg)			193J	933J				85.8J		59.9J	26.5J				
2,3,4,6,7,8-HxCDF	(ng/kg)			108J	111				9.16J		6J	17.6J				
1,2,3,7,8,9-HxCDF	(ng/kg)															
1,2,3,4,6,7,8-HpCDF	(ng/kg)			7460	4470J			31.7	354		256	559J				
1,2,3,4,7,8,9-HpCDF	(ng/kg)			855J	527				38.3J		30.7J	54.5J				
OCDF	(ng/kg)			44300	29200J			130	1250		1150J	1500J				
TCDDs (total)	(ng/kg)			75.6J	66.4J			1.09J			0.301J	26.5J				
PeCDDs (total)	(ng/kg)			166J	214J			2.4J	12.6J		3.97J	78.3J				
HxCDDs (Total)	(ng/kg)			4100J	3930J			35.7J	170J		101J	667J				
HpCDDs (total)	(ng/kg)			60500J	27200J			280J	1350J		1410J	4300J				
TCDFs (total)	(ng/kg)			67.8JEB	968J			7.82JEB	54.9JEB		43.6JEB	122J				
PeCDFs (total)	(ng/kg)			523J	2530J			11.1J	320J		275J	188J				
HxCDFs (total)	(ng/kg)			8340J	16300J			35.1J	1160J		998J	649J				
HpCDFs (total)	(ng/kg)			45300J	9480J			116J	1490J		1230J	2060J				
TEQ EMPC (ND=0) 1989	(ng/kg)	16		[1000]J	[800]J			4.4J	[40]J		[36]J	[93]J				
TEQ EMPC (ND=0) 1998	(ng/kg)	16		[730]J	[640]J			3.2J	[36]J		[27]J	[79]J				

Table 4.1-3
Detected Concentrations in Surface Soil

CONSTITUENT	UNITS	EPA Region IX PRG for Industrial Soil	SS-030 D03519 11/7/2002 0-1 Primary	SS-030 D03651 11/19/2002 0-1 Primary	SS-030 D03652 11/19/2002 0-1 Duplicate 1	SS-031 D03533 11/7/2002 0-1 Primary	SS-031 D03653 11/19/2002 0-1 Primary	SS-033 MAJF62 11/11/2002 0-1 Primary	SS-034 MAJF63 11/11/2002 0-1 Primary	SS-034 MAJF64 11/11/2002 0-1 Duplicate 1	SS-035 D03535 11/7/2002 0-1 Primary	SS-035 D03645 11/19/2002 0-1 Primary	SS-036 D03536 11/7/2002 0-1 Primary	SS-036 D03656 11/19/2002 0-1 Primary	SS-037 MAJF66 11/12/2002 0-1 Primary	SS-038 MAJF65 11/12/2002 0-1 Primary
VOCs																
Benzene	(ug/kg)	1300														
Toluene	(ug/kg)	220000														
Xylenes (total)	(ug/kg)	90000														
SVOCs																
Benzaldehyde	(ug/kg)	6200000		170JB			150JB					120B		860B		
Phenol	(ug/kg)	37000000														
2-Chlorophenol	(ug/kg)	24000														
2-Methylphenol	(ug/kg)	3100000														
Acetophenone	(ug/kg)													66J		
4-Methylphenol	(ug/kg)	310000														
2-Nitrophenol	(ug/kg)															
2,4-Dimethylphenol	(ug/kg)	1200000														
2,4-Dichlorophenol	(ug/kg)	180000														
Naphthalene	(ug/kg)	19000		130J			170J							470		
4-Chloro-3-methylphenol	(ug/kg)															
2-Methylnaphthalene	(ug/kg)			96J			160J							390		
2,4,6-Trichlorophenol	(ug/kg)	6200														
2,4,5-Trichlorophenol	(ug/kg)	6200000														
Biphenyl	(ug/kg)	350000												89J		
Acenaphthylene	(ug/kg)			970			1100							240		
Acenaphthene	(ug/kg)	2900000														
2,4-Dinitrophenol	(ug/kg)	120000														
4-Nitrophenol	(ug/kg)															
Dibenzofuran	(ug/kg)	310000					110J							210		
Fluorene	(ug/kg)	2600000		110J			330									
4,6-Dinitro-2-methylphenol	(ug/kg)															
Pentachlorophenol	(ug/kg)	9000		160J										94J		
Phenanthrene	(ug/kg)			2900			5000							980		
Anthracene	(ug/kg)	24000000		510			690							170		
Carbazole	(ug/kg)	86000		240			340							150		
Fluoranthene	(ug/kg)	2200000		6300			8000							1600		
Pyrene	(ug/kg)	2900000		6100			8100							1400		
Benzo(a)anthracene	(ug/kg)	2100		[2500]			[3500]							720		
Chrysene	(ug/kg)	210000		4100			4900							1300		
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000		150J			120JB					73J		100JB		
Benzo(b)fluoranthene	(ug/kg)	2100		[4300]			[5100]							1400		
Benzo(k)fluoranthene	(ug/kg)	21000		4000			4700							1100		
Benzo(a)pyrene	(ug/kg)	210		[3100]			[3700]							[630]		
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100		1100			1100							210		
Dibenz(a,h) anthracene	(ug/kg)	210		[320]			[360]							78J		
Benzo(g,h,i)perylene	(ug/kg)			800			830							140		
Metals																
Aluminum	(mg/kg)	92000	3900			5200		3470	2930	1650	11000		2600		4670	5070
Antimony	(mg/kg)	41						5.1JEB	12.2N	6BN			7.5J			
Arsenic	(mg/kg)	1.6	[17]J			[8.1]J		[13.5]	[8.9]	[3.5]	[3.9]J		[29]J		[3.6]	[14.8]
Barium	(mg/kg)	6700	32J			29J		45	88.2	36.5B	31J		54J		16.5	53.2
Beryllium	(mg/kg)	1900	0.24J			0.28J			0.27B	0.15B	0.39J		0.28J			
Cadmium	(mg/kg)	45	0.39J			0.23J		4.1			0.15J		0.23J			0.27
Calcium	(mg/kg)		640J			920		5930J	2420	2330	1300		1300		889J	16600J
Chromium(total)	(mg/kg)	450	28J			15J		10.2	24.5	6.9	12J		19J		6.4	14.4
Cobalt	(mg/kg)	1900	2J			2.7J		5.7	16.4	2.3B	2.8J		4.2J		3.5	4
Copper	(mg/kg)	4100	28J			24J		96.6	112E	46.9E	16J		130J		10.3	31.6
Iron	(mg/kg)	31000	390			9600		22100	26200	10700	14000		29000		8800	12400
Lead	(mg/kg)	75	[180]J			[170]J		[382]	[731]	[310]	35J		[230]J		24.6	[83.4]
Magnesium	(mg/kg)		1000			1400		1390	1250	708B	1300J		590J		1910	2140
Manganese	(mg/kg)	1900	15J			200J		166	166	75.5	130J		210J		178	200
Mercury	(mg/kg)	31	0.1			0.16		0.2	30.5	5.5	0.25		0.52			0.29

Table 4.1-3
Detected Concentrations in Surface Soil

			SS-030	SS-030	SS-030	SS-031	SS-031	SS-033	SS-034	SS-034	SS-035	SS-035	SS-036	SS-036	SS-037	SS-038
			D03519	D03651	D03652	D03533	D03653	MAJF62	MAJF63	MAJF64	D03535	D03645	D03536	D03656	MAJF66	MAJF65
		EPA Region IX	11/7/2002	11/19/2002	11/19/2002	11/7/2002	11/19/2002	11/11/2002	11/11/2002	11/11/2002	11/7/2002	11/19/2002	11/7/2002	11/19/2002	11/12/2002	11/12/2002
		PRG for	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary
Nickel	(mg/kg)	2000	7JEB			8.1JEB		7.7	9.8E	2.1BE	7.1JEB		7.6JEB		5.7	9.2
Potassium	(mg/kg)					200J		258J	451BE	210BE	320J		200J		244J	386J
Selenium	(mg/kg)	510	0.33J					1.7	0.93B		0.82J		1.5		0.86J	1.4
Silver	(mg/kg)	510							0.74BN	0.28BN			0.23J			
Sodium	(mg/kg)								207B	135B						
Thallium	(mg/kg)	6.7							0.85B		0.083J					
Vanadium	(mg/kg)	720	14J			13J		15.2	15.8	8.3B	24J		12J		12.6	15
Zinc	(mg/kg)	31000	99JEB			71JEB		421	131	56.5	32JEB		52JEB		27.7	218
Dioxin																
2,3,7,8-TCDD	(ng/kg)	16			2.37J		1.62					[171]		4.74		
1,2,3,7,8-PeCDD	(ng/kg)			39.4J	36.6J		18.6J					6.81J		13.6J		
1,2,3,4,7,8-HxCDD	(ng/kg)			119	148		66J					12		25.8		
1,2,3,6,7,8-HxCDD	(ng/kg)			328	358		157J					35.9		83.5		
1,2,3,7,8,9-HxCDD	(ng/kg)			228	241		110J					23.7		55.9		
1,2,3,4,6,7,8-HpCDD	(ng/kg)			8760	8600		5610					930		1470		
OCDD	(ng/kg)			60700J	60100J		37500J					6240J		11100J		
2,3,7,8-TCDF	(ng/kg)			2.25	2.44		2.22					2.44		1.45		
1,2,3,7,8-PeCDF	(ng/kg)			5.11	6.37		3.78					2.44		3.9		
2,3,4,7,8-PeCDF	(ng/kg)			6.74J	7.58J		7.27J					2.29J		4.11J		
1,2,3,4,7,8-HxCDF	(ng/kg)			78.2	82.1		51.8					12.5		30.9		
1,2,3,6,7,8-HxCDF	(ng/kg)			73	75.6		45.9					7.44		26.7		
2,3,4,6,7,8-HxCDF	(ng/kg)			49.7	50.3		33.9					4.58		12.7		
1,2,3,7,8,9-HxCDF	(ng/kg)															
1,2,3,4,6,7,8-HpCDF	(ng/kg)			1720	1540		1220					149		556		
1,2,3,4,7,8,9-HpCDF	(ng/kg)			231	216		124					22.4		51.3		
OCDF	(ng/kg)			8050	5960		4600					354		1450		
TCDDs (total)	(ng/kg)			10.2J	15J		10.5J					360J		23.7J		
PeCDDs (total)	(ng/kg)			158J	157J		79.8J					64.1J		105J		
HxCDDs (Total)	(ng/kg)			1630J	1880J		852J					328J		532J		
HpCDDs (total)	(ng/kg)			15400JEB	15300JEB		8730JEB					2360JEB		2820JEB		
TCDFs (total)	(ng/kg)			72.6J	69.7J		53.9J					39.2J		92.1J		
PeCDFs (total)	(ng/kg)			449JEB	450JEB		367JEB					68.7JEB		172JEB		
HxCDFs (total)	(ng/kg)			2950J	2910J		1660J					277J		771J		
HpCDFs (total)	(ng/kg)			8410J	7620J		4680J					736J		1970J		
TEQ EMPC (ND=0) 1989	(ng/kg)	16		[290]J	[290]J		[170]J					[200]J		[71]J		
TEQ EMPC (ND=0) 1998	(ng/kg)	16		[240]J	[250]J		[140]J					[200]J		[66]J		

Table 4.1-3
Detected Concentrations in Surface Soil

			SS-039	SS-039	SS-039	SS-039	SS-040	SS-041	SS-041	SS-042	SS-043	SS-043	SS-044	SS-044	SS-045	SS-058
			MAJF68	MAJF77	MAJF69	MAJF78	MAJF70	MAJF71	D03655	MAJF72	MAJF73	MAJF74	MAJF75	D03642	MAJF76	D03657
		EPA Region IX	11/12/2002	11/12/2002	11/12/2002	11/12/2002	11/12/2002	11/12/2002	11/19/2002	11/12/2002	11/12/2002	11/12/2002	11/12/2002	11/19/2002	11/12/2002	11/20/2002
		PRG for	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
CONSTITUENT	UNITS	Industrial Soil	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary
VOCs																
Benzene	(ug/kg)	1300														
Toluene	(ug/kg)	220000														
Xylenes (total)	(ug/kg)	90000														
SVOCs																
Benzaldehyde	(ug/kg)	6200000							360B					140B		760B
Phenol	(ug/kg)	37000000														
2-Chlorophenol	(ug/kg)	24000														
2-Methylphenol	(ug/kg)	3100000														
Acetophenone	(ug/kg)															
4-Methylphenol	(ug/kg)	310000														
2-Nitrophenol	(ug/kg)															
2,4-Dimethylphenol	(ug/kg)	1200000														
2,4-Dichlorophenol	(ug/kg)	180000														
Naphthalene	(ug/kg)	19000												1500		100J
4-Chloro-3-methylphenol	(ug/kg)															
2-Methylnaphthalene	(ug/kg)													410		220
2,4,6-Trichlorophenol	(ug/kg)	6200														
2,4,5-Trichlorophenol	(ug/kg)	6200000														
Biphenyl	(ug/kg)	350000												71J		
Acenaphthylene	(ug/kg)															67J
Acenaphthene	(ug/kg)	2900000												170		
2,4-Dinitrophenol	(ug/kg)	120000														
4-Nitrophenol	(ug/kg)															
Dibenzofuran	(ug/kg)	310000												130		65J
Fluorene	(ug/kg)	2600000												87J		
4,6-Dinitro-2-methylphenol	(ug/kg)															
Pentachlorophenol	(ug/kg)	9000												590		8600
Phenanthrene	(ug/kg)								180					610		280
Anthracene	(ug/kg)	24000000												87J		
Carbazole	(ug/kg)	86000												69J		
Fluoranthene	(ug/kg)	2200000							300					670		460
Pyrene	(ug/kg)	2900000							260					530		420
Benzo(a)anthracene	(ug/kg)	2100							100J					310		180
Chrysene	(ug/kg)	210000							210					460		330
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000							88JB					55J		460B
Benzo(b)fluoranthene	(ug/kg)	2100							150					340		340
Benzo(k)fluoranthene	(ug/kg)	21000							140J					310		290
Benzo(a)pyrene	(ug/kg)	210							100J					[260]		200
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100												120		110J
Dibenz(a,h) anthracene	(ug/kg)	210														
Benzo(g,h,i)perylene	(ug/kg)													110J		84J
Metals																
Aluminum	(mg/kg)	92000	9660	9320	7260	6790	6040	10600		2940	3120	2160	4920		7890	
Antimony	(mg/kg)	41	2.3BN	2.4BN	1.9BN								4.1JEB			
Arsenic	(mg/kg)	1.6	[11.3]	[11.2]	[7.6]	[6.3]	[1.9]	[4.1]		[5.8]	[38.6]	[20.3]	[23.6]		[12.8]	
Barium	(mg/kg)	6700	66.6	63.2	45.2B	45.4B	17.6	28.6		18.9	50.8	26.8B	61.1		47.1	
Beryllium	(mg/kg)	1900	0.59B	0.5B	0.36B	0.33B		0.45			0.15B	0.11B			1.4	
Cadmium	(mg/kg)	45														
Calcium	(mg/kg)		961B	973B	1080B	829B	844J	864J		921J	634B	514B	768J		1960J	
Chromium(total)	(mg/kg)	450	15.6	15.6	9	9	8.4	13.2		5.8	34.4	4.6	13.6		42.6	
Cobalt	(mg/kg)	1900	11.1	12.2	3.9B	3.4B	3.1	4		2.2	21.1	2.1B	4.2J		9	
Copper	(mg/kg)	4100	57.8E	55.6E	29.9E	26.8E	5.8	7.7		5.6	20.1E	6.1E	38.8		78.6	
Iron	(mg/kg)	31000	17700	18100	13600	12300	9270	12900		11400	30100	18000	19600		25100	
Lead	(mg/kg)	75	[84.8]	[79.1]	60.2	51.7	8.6	8.3		7.6	15	8.3	[133]		[198]	
Magnesium	(mg/kg)		828B	921B	1010B	776B	2090	2040		1400	1260	903B	2210		3160	
Manganese	(mg/kg)	1900	149	153	124	114	183	152		171	118	89.7	165		689	
Mercury	(mg/kg)	31	0.22	0.22									0.21		0.072J	

Table 4.1-3
Detected Concentrations in Surface Soil

			SS-039	SS-039	SS-039	SS-039	SS-040	SS-041	SS-041	SS-042	SS-043	SS-043	SS-044	SS-044	SS-045	SS-058
			MAJF68	MAJF77	MAJF69	MAJF78	MAJF70	MAJF71	D03655	MAJF72	MAJF73	MAJF74	MAJF75	D03642	MAJF76	D03657
		EPA Region IX	11/12/2002	11/12/2002	11/12/2002	11/12/2002	11/12/2002	11/12/2002	11/19/2002	11/12/2002	11/12/2002	11/12/2002	11/12/2002	11/19/2002	11/12/2002	11/20/2002
		PRG for	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
CONSTITUENT	UNITS	Industrial Soil	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary
Nickel	(mg/kg)	2000	6.9BE	7BE	4.3BE	4.2BE	5.1	6.8		2.6	14.6E	0.91BE	7.7		43.6	
Potassium	(mg/kg)		278BE	283BE	197BE	196BE	246J	378J		210J	574BE	292BE	367J		413J	
Selenium	(mg/kg)	510	0.93B	1.3	1.2			1.2		0.91J	2	1.1	3.1		2.1	
Silver	(mg/kg)	510	0.61BN	0.51BN	0.32BN	0.33BN					0.6BN	0.35BE				
Sodium	(mg/kg)		107B	117B	128B	120B					221B	157B				
Thallium	(mg/kg)	6.7									1.7B					
Vanadium	(mg/kg)	720	22.7	22.5	16.8	16.2	13.4	21		9.2	15.2	9.2B	23.7		18.6	
Zinc	(mg/kg)	31000	33.2	33.1	27.1	24.7	26.3	25.6		14.8	22.6	13	37.8		289	
Dioxin																
2,3,7,8-TCDD	(ng/kg)	16														
1,2,3,7,8-PeCDD	(ng/kg)															
1,2,3,4,7,8-HxCDD	(ng/kg)															
1,2,3,6,7,8-HxCDD	(ng/kg)															
1,2,3,7,8,9-HxCDD	(ng/kg)															
1,2,3,4,6,7,8-HpCDD	(ng/kg)															
OCDD	(ng/kg)															
2,3,7,8-TCDF	(ng/kg)															
1,2,3,7,8-PeCDF	(ng/kg)															
2,3,4,7,8-PeCDF	(ng/kg)															
1,2,3,4,7,8-HxCDF	(ng/kg)															
1,2,3,6,7,8-HxCDF	(ng/kg)															
2,3,4,6,7,8-HxCDF	(ng/kg)															
1,2,3,7,8,9-HxCDF	(ng/kg)															
1,2,3,4,6,7,8-HpCDF	(ng/kg)															
1,2,3,4,7,8,9-HpCDF	(ng/kg)															
OCDF	(ng/kg)															
TCDDs (total)	(ng/kg)															
PeCDDs (total)	(ng/kg)															
HxCDDs (Total)	(ng/kg)															
HpCDDs (total)	(ng/kg)															
TCDFs (total)	(ng/kg)															
PeCDFs (total)	(ng/kg)															
HxCDFs (total)	(ng/kg)															
HpCDFs (total)	(ng/kg)															
TEQ EMPC (ND=0) 1989	(ng/kg)	16														
TEQ EMPC (ND=0) 1998	(ng/kg)	16														

Table 4.1-3
Detected Concentrations in Surface Soil

			SS-058	SS-059	SS-059	SS-060	SS-060	SS-061	SS-061	SS-062	SS-062	SS-062	SS-062	SS-063	SS-063
			MAJF80	D03658	MAJF81	D03659	MAJF82	D03660	MAJF83	D03663	MAJF86	D03664	MAJF87	D03662	MAJF85
		EPA Region IX	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002
		PRG for	-	0-1	-	0-1	-	0-1	-	0-1	-	0-1	-	0-1	-
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Duplicate 1	Primary	Primary
VOCs															
Benzene	(ug/kg)	1300													
Toluene	(ug/kg)	220000													
Xylenes (total)	(ug/kg)	90000													
SVOCs															
Benzaldehyde	(ug/kg)	6200000		87JB		180B		99JB						270B	
Phenol	(ug/kg)	37000000													
2-Chlorophenol	(ug/kg)	24000													
2-Methylphenol	(ug/kg)	3100000								120		140			
Acetophenone	(ug/kg)									72J		79J		140	
4-Methylphenol	(ug/kg)	310000								360		400			
2-Nitrophenol	(ug/kg)														
2,4-Dimethylphenol	(ug/kg)	1200000								91J		95J			
2,4-Dichlorophenol	(ug/kg)	180000													
Naphthalene	(ug/kg)	19000		400		330		68J		2100		2300		200	
4-Chloro-3-methylphenol	(ug/kg)														
2-Methylnaphthalene	(ug/kg)			240		340		69J		1100		1100		180	
2,4,6-Trichlorophenol	(ug/kg)	6200													
2,4,5-Trichlorophenol	(ug/kg)	6200000													
Biphenyl	(ug/kg)	350000		64J		84J				160		170			
Acenaphthylene	(ug/kg)			320		120				270		290		160	
Acenaphthene	(ug/kg)	2900000								68J		75J			
2,4-Dinitrophenol	(ug/kg)	120000													
4-Nitrophenol	(ug/kg)														
Dibenzofuran	(ug/kg)	310000		120		110J				320		330		64J	
Fluorene	(ug/kg)	2600000		72J											
4,6-Dinitro-2-methylphenol	(ug/kg)														
Pentachlorophenol	(ug/kg)	9000		4100		1300		64J		490		540		220J	
Phenanthrene	(ug/kg)			1200		770		160		700		840		470	
Anthracene	(ug/kg)	24000000		320		110J				300		330		88J	
Carbazole	(ug/kg)	86000		150		72J				130		160		77J	
Fluoranthene	(ug/kg)	2200000		2400		1200		410		1500		1900		870	
Pyrene	(ug/kg)	2900000		2500		1100		340		1400		1700		700	
Benzo(a)anthracene	(ug/kg)	2100		1300		540		150		660		770		360	
Chrysene	(ug/kg)	210000		1600		850		180		900		1100		610	
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000		190B				69JB		62JB				270B	
Benzo(b)fluoranthene	(ug/kg)	2100		[2100]		690		140		1200		1300		540	
Benzo(k)fluoranthene	(ug/kg)	21000		1700		630		120		980		1200		450	
Benzo(a)pyrene	(ug/kg)	210		[1400]		[500]		89J		[660]		[780]		[320]	
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100		440		190		80J		270		320		280	
Dibenz(a,h) anthracene	(ug/kg)	210		130		64J				86J		95J		86J	
Benzo(g,h,i)perylene	(ug/kg)			310		140		73J		200		220		240	
Metals															
Aluminum	(mg/kg)	92000	3420		2920		3140		5080		3430		3250		5100
Antimony	(mg/kg)	41	28.8		1B		6.8B				1.1B		1.4B		0.82B
Arsenic	(mg/kg)	1.6	[1860]*		[58.2]*		[19.4]*		[4.5]*		[30.3]*		[25.8]*		[20.3]*
Barium	(mg/kg)	6700	50.8B		19.6B		36.8B		20.4B		24.3B		21.3B		58.3
Beryllium	(mg/kg)	1900	0.3B		0.2B		0.28B		0.21B		0.18B		0.17B		0.29B
Cadmium	(mg/kg)	45	0.86B												0.16B
Calcium	(mg/kg)		2870		962B		3620		1100		1320		1220		29300
Chromium(total)	(mg/kg)	450	[2230]*		87.2*		23.9*		8.5*		27.2*		22*		40*
Cobalt	(mg/kg)	1900	2.2B		2.3B		3.8B		2.5B		2.3B		2B		3.9B
Copper	(mg/kg)	4100	1240N*		64N*		77.9N*		14.7N*		41.5N*		35.5N*		40.5N*
Iron	(mg/kg)	31000	7760		9920		19000		9030		12200		11400		16200
Lead	(mg/kg)	75	56.9*		74*		[288]*		51.6*		[89.3]*		[80.2]*		[130]*
Magnesium	(mg/kg)		1520		1000B		1160		1480		1240		1160		2080
Manganese	(mg/kg)	1900	192		126		190		151		99.1		84.2		262
Mercury	(mg/kg)	31	1.2		0.089B		0.22		0.2		0.079B		0.097B		0.27

Table 4.1-3
Detected Concentrations in Surface Soil

			SS-058	SS-059	SS-059	SS-060	SS-060	SS-061	SS-061	SS-062	SS-062	SS-062	SS-062	SS-063	SS-063
			MAJF80	D03658	MAJF81	D03659	MAJF82	D03660	MAJF83	D03663	MAJF86	D03664	MAJF87	D03662	MAJF85
		EPA Region IX	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002	11/20/2002
		PRG for	-	0-1	-	0-1	-	0-1	-	0-1	-	0-1	-	0-1	-
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Duplicate 1	Primary	Primary
Nickel	(mg/kg)	2000	5.2B		4.7B		6B		4.8B		4.2B		3.7B		18.6
Potassium	(mg/kg)		371B		293B		266B		285B		265B		241B		532B
Selenium	(mg/kg)	510	1B		0.94B		1.8		1.6		1.2		1.2		1.3
Silver	(mg/kg)	510	0.22B				0.16B								
Sodium	(mg/kg)		204B		129B		155B		227B		131B		118B		191B
Thallium	(mg/kg)	6.7													
Vanadium	(mg/kg)	720	6.9B		9.5B		11B		10.8B		10.5B		10.4B		14.2
Zinc	(mg/kg)	31000	99E*		47.8E*		49.8E*		89E*		22.5E*		19.9E*		54.9E*
Dioxin															
2,3,7,8-TCDD	(ng/kg)	16													
1,2,3,7,8-PeCDD	(ng/kg)														
1,2,3,4,7,8-HxCDD	(ng/kg)														
1,2,3,6,7,8-HxCDD	(ng/kg)														
1,2,3,7,8,9-HxCDD	(ng/kg)														
1,2,3,4,6,7,8-HpCDD	(ng/kg)														
OCDD	(ng/kg)														
2,3,7,8-TCDF	(ng/kg)														
1,2,3,7,8-PeCDF	(ng/kg)														
2,3,4,7,8-PeCDF	(ng/kg)														
1,2,3,4,7,8-HxCDF	(ng/kg)														
1,2,3,6,7,8-HxCDF	(ng/kg)														
2,3,4,6,7,8-HxCDF	(ng/kg)														
1,2,3,7,8,9-HxCDF	(ng/kg)														
1,2,3,4,6,7,8-HpCDF	(ng/kg)														
1,2,3,4,7,8,9-HpCDF	(ng/kg)														
OCDF	(ng/kg)														
TCDDs (total)	(ng/kg)														
PeCDDs (total)	(ng/kg)														
HxCDDs (Total)	(ng/kg)														
HpCDDs (total)	(ng/kg)														
TCDFs (total)	(ng/kg)														
PeCDFs (total)	(ng/kg)														
HxCDFs (total)	(ng/kg)														
HpCDFs (total)	(ng/kg)														
TEQ EMPC (ND=0) 1989	(ng/kg)	16													
TEQ EMPC (ND=0) 1998	(ng/kg)	16													

Table 4.1-3
Detected Concentrations in Surface Soil

			SS-064	SS-064	SSHP01	SSHP02	SSHP03	SSHP04	SSHP05	SSHP06
			D03661	MAJF84						
		EPA Region IX	11/20/2002	11/20/2002	10/16/1998	10/16/1998	10/16/1998	10/16/1998	10/16/1998	10/16/1998
		PRG for	0-1	-	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs										
Benzene	(ug/kg)	1300								
Toluene	(ug/kg)	220000								
Xylenes (total)	(ug/kg)	90000								
SVOCs										
Benzaldehyde	(ug/kg)	6200000	100JB							
Phenol	(ug/kg)	37000000								
2-Chlorophenol	(ug/kg)	24000								
2-Methylphenol	(ug/kg)	3100000								
Acetophenone	(ug/kg)									
4-Methylphenol	(ug/kg)	310000								
2-Nitrophenol	(ug/kg)									
2,4-Dimethylphenol	(ug/kg)	1200000								
2,4-Dichlorophenol	(ug/kg)	180000								
Naphthalene	(ug/kg)	19000	60J		35	28				
4-Chloro-3-methylphenol	(ug/kg)									
2-Methylnaphthalene	(ug/kg)		68J		56					
2,4,6-Trichlorophenol	(ug/kg)	6200								
2,4,5-Trichlorophenol	(ug/kg)	6200000								
Biphenyl	(ug/kg)	350000								
Acenaphthylene	(ug/kg)				32					
Acenaphthene	(ug/kg)	2900000								
2,4-Dinitrophenol	(ug/kg)	120000								
4-Nitrophenol	(ug/kg)									
Dibenzofuran	(ug/kg)	310000			22					
Fluorene	(ug/kg)	2600000								
4,6-Dinitro-2-methylphenol	(ug/kg)									
Pentachlorophenol	(ug/kg)	9000			1300	340				
Phenanthrene	(ug/kg)		160		140	83				
Anthracene	(ug/kg)	24000000			28	14				
Carbazole	(ug/kg)	86000								
Fluoranthene	(ug/kg)	2200000	240		190	130				
Pyrene	(ug/kg)	2900000	190		200	150				
Benzo(a)anthracene	(ug/kg)	2100	110		90	62				
Chrysene	(ug/kg)	210000	190		190	130				
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000	49JB							
Benzo(b)fluoranthene	(ug/kg)	2100	140		100	93				
Benzo(k)fluoranthene	(ug/kg)	21000	140		120	55				
Benzo(a)pyrene	(ug/kg)	210	97J		70	50				
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100	71J		65	42				
Dibenz(a,h) anthracene	(ug/kg)	210								
Benzo(g,h,i)perylene	(ug/kg)		65J		69	440				
Metals										
Aluminum	(mg/kg)	92000		2370	5310	3330				
Antimony	(mg/kg)	41			2.9					
Arsenic	(mg/kg)	1.6		[62.5]*	[369]	[23.5]				
Barium	(mg/kg)	6700		32.8B	27.5	20.2				
Beryllium	(mg/kg)	1900		0.1B	1.4	1				
Cadmium	(mg/kg)	45			1.1	0.89				
Calcium	(mg/kg)			378B	838	706				
Chromium(total)	(mg/kg)	450		16.9*	392	12.3				
Cobalt	(mg/kg)	1900		0.74B	3.6	2.9				
Copper	(mg/kg)	4100		2.1BN*	265	224				
Iron	(mg/kg)	31000		19600	22000	15800				
Lead	(mg/kg)	75		30.8*	28.8	[81.7]				
Magnesium	(mg/kg)			767B	1780	1240				
Manganese	(mg/kg)	1900		83.5	163	123				
Mercury	(mg/kg)	31		0.14						

Table 4.1-3
Detected Concentrations in Surface Soil

			SS-064	SS-064	SSHP01	SSHP02	SSHP03	SSHP04	SSHP05	SSHP06
			D03661	MAJF84						
		EPA Region IX	11/20/2002	11/20/2002	10/16/1998	10/16/1998	10/16/1998	10/16/1998	10/16/1998	10/16/1998
		PRG for	0-1	-	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Nickel	(mg/kg)	2000		2B	5.6	4.4				
Potassium	(mg/kg)			374B	349	268				
Selenium	(mg/kg)	510		8	3.2	3.3				
Silver	(mg/kg)	510								
Sodium	(mg/kg)			231B	81.8	69				
Thallium	(mg/kg)	6.7								
Vanadium	(mg/kg)	720		17.9	17.3	12				
Zinc	(mg/kg)	31000		19.3E*	30.7	31.8				
Dioxin										
2,3,7,8-TCDD	(ng/kg)	16			4.77J	1.01J	2.8*	1.26J	3.52J	
1,2,3,7,8-PeCDD	(ng/kg)				34.2J	8.78*	28.1J	10.2J	25.5J	1.98J
1,2,3,4,7,8-HxCDD	(ng/kg)				79.7J	26.8*	70.4J	22.8J	47J	
1,2,3,6,7,8-HxCDD	(ng/kg)				298J	83.8J	228J	53J	135J	12.8J
1,2,3,7,8,9-HxCDD	(ng/kg)				143J	38.2J	132J	40.6J	87.2J	
1,2,3,4,6,7,8-HpCDD	(ng/kg)				7020J	2370J	3710J	1130J	3280J	352J
OCDD	(ng/kg)				52400J	22400J	29600J	8290J	33700J	2750J
2,3,7,8-TCDF	(ng/kg)				2.34J	0.862*	1.09J		2.1J	
1,2,3,7,8-PeCDF	(ng/kg)				11.9J	3.23*	9.32J	3.33J	9.54J	
2,3,4,7,8-PeCDF	(ng/kg)				8.55J	2.85J	5.96J	2.57J	6.75J	0.458J
1,2,3,4,7,8-HxCDF	(ng/kg)				144J	40.2J	87.1J	30.6J	106J	6.8J
1,2,3,6,7,8-HxCDF	(ng/kg)				207J	34J	217J	81.8J	261J	10.3J
2,3,4,6,7,8-HxCDF	(ng/kg)				59.4J	17.3J	33.7J	15J	43.1J	4.3*
1,2,3,7,8,9-HxCDF	(ng/kg)									
1,2,3,4,6,7,8-HpCDF	(ng/kg)				2710J	902J	1060J	598J	2460J	157J
1,2,3,4,7,8,9-HpCDF	(ng/kg)				328J	109J	195J	61.9J	222J	15.3J
OCDF	(ng/kg)				7800J	3000J	3120J	1630J	8000J	519J
TCDDs (total)	(ng/kg)									
PeCDDs (total)	(ng/kg)				59.9J		73.8J	27.5J	55.8J	3.09J
HxCDDs (Total)	(ng/kg)									
HpCDDs (total)	(ng/kg)				11850J	3780J	7430J	1890J	5190J	542J
TCDFs (total)	(ng/kg)									
PeCDFs (total)	(ng/kg)				811J	118J	902J	320J	674J	31.4J
HxCDFs (total)	(ng/kg)				4750J	1070J	3890J	1200J	3970J	186J
HpCDFs (total)	(ng/kg)				13500J	3949J	6280J	2010J	10300J	542J
TEQ EMPC (ND=0) 1989	(ng/kg)	16			[281]J	[90.3]J	[180]J	[60]J	[190]J	13.2J
TEQ EMPC (ND=0) 1998	(ng/kg)	16			[243.784]J	[71.8427]J	[164.197]J	[56.1825]J	[164.802]J	11.1989J

Table 4.1-4
Detected Concentrations in Subsurface Soil

			B-001-88	B-002-88	B-003-88	B-004-88	B-005-88	B-006-88	B-007-88	B-008-88	B-009-88	B-010-88	B-011-88	B-012-89	B-013-89	B-014-89	B-015-89
			B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10	B-11				
		EPA Region IX	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/9/1989	1/9/1989	1/9/1989	1/10/1989
		PRG for	8-10	8-10	6-8	6-8	2-4	6-8	4-6	6-8	2-4	6-8	7-9	10-12	5-7	5-7	5-7
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																	
Benzene	(ug/kg)	1300															
Toluene	(ug/kg)	220000													23.82		
Xylenes (total)	(ug/kg)	90000	1000											140			
SVOCs																	
Benzaldehyde	(ug/kg)	6200000															
Phenol	(ug/kg)	37000000															
2-Chlorophenol	(ug/kg)	24000															
2-Methylphenol	(ug/kg)	3100000															
4-Methylphenol	(ug/kg)	310000															
2-Nitrophenol	(ug/kg)																
2,4-Dimethylphenol	(ug/kg)	1200000															
2,4-Dichlorophenol	(ug/kg)	180000												1000			
Naphthalene	(ug/kg)	19000															
4-Chloro-3-methylphenol	(ug/kg)																
2-Methylnaphthalene	(ug/kg)																
2,4,6-Trichlorophenol	(ug/kg)	6200															
2,4,5-Trichlorophenol	(ug/kg)	6200000															
Biphenyl	(ug/kg)	350000															
Acenaphthylene	(ug/kg)																
Acenaphthene	(ug/kg)	2900000															
2,4-Dinitrophenol	(ug/kg)	120000		19500	1580		3600		310	[251000]			97400				
4-Nitrophenol	(ug/kg)																
2,3,5,6-Tetrachlorophenol	(ug/kg)													793.5	6384.12	6035.2	10328.74
Dibenzofuran	(ug/kg)	310000															
Fluorene	(ug/kg)	2600000															
4,6-Dinitro-2-methylphenol	(ug/kg)																
Pentachlorophenol	(ug/kg)	9000					1400	[490000]		[343000]	1510	2760	[220000]	[16900]	[110500]	[111800]	[95000]
Phenanthrene	(ug/kg)																
Anthracene	(ug/kg)	24000000															
Fluoranthene	(ug/kg)	2200000															
Pyrene	(ug/kg)	2900000															
Benzo(a)anthracene	(ug/kg)	2100															
Chrysene	(ug/kg)	210000															
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000															
Benzo(b)fluoranthene	(ug/kg)	2100															
Benzo(k)fluoranthene	(ug/kg)	21000															
Benzo(a)pyrene	(ug/kg)	210															
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100															
Benzo(g,h,i)perylene	(ug/kg)																
Metals																	
Aluminum	(mg/kg)	92000															
Antimony	(mg/kg)	41															
Arsenic	(mg/kg)	1.6		1.3	1.1	[4.7]	[2.6]	1.1	[1.6]	[4.6]	[3.9]	1.3	[2.4]	[1.6]	[7.3]	1.1	[1.6]
Barium	(mg/kg)	6700															
Beryllium	(mg/kg)	1900															
Cadmium	(mg/kg)	45															
Calcium	(mg/kg)																
Chromium(total)	(mg/kg)	450	5.6	37.9	6.9	8.1	9.7	44.7	9.4	6	10.2	15.6	7.6	31.5	10.8	9.9	14.2
Cobalt	(mg/kg)	1900															
Copper	(mg/kg)	4100	7.9	12.2	8.4	9.7	7.9	11.3	8.1	8.3	145	15.3	9.5	11.3	14.7	12.6	11.8
Iron	(mg/kg)	31000															
Lead	(mg/kg)	75															
Magnesium	(mg/kg)																
Manganese	(mg/kg)	1900															
Mercury	(mg/kg)	31															
Nickel	(mg/kg)	2000															
Potassium	(mg/kg)																

Table 4.1-4
Detected Concentrations in Subsurface Soil

			B-001-88	B-002-88	B-003-88	B-004-88	B-005-88	B-006-88	B-007-88	B-008-88	B-009-88	B-010-88	B-011-88	B-012-89	B-013-89	B-014-89	B-015-89
			B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10	B-11				
		EPA Region IX	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/9/1989	1/9/1989	1/9/1989	1/10/1989
		PRG for	8-10	8-10	6-8	6-8	2-4	6-8	4-6	6-8	2-4	6-8	7-9	10-12	5-7	5-7	5-7
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Selenium	(mg/kg)	510															
Silver	(mg/kg)	510															
Sodium	(mg/kg)																
Vanadium	(mg/kg)	720															
Zinc	(mg/kg)	31000															
Dioxin																	
2,3,7,8-TCDD	(ng/kg)	16															
1,2,3,7,8-PeCDD	(ng/kg)																
1,2,3,4,7,8-HxCDD	(ng/kg)																
1,2,3,6,7,8-HxCDD	(ng/kg)																
1,2,3,7,8,9-HxCDD	(ng/kg)																
1,2,3,4,6,7,8-HpCDD	(ng/kg)																
OCDD	(ng/kg)																
2,3,7,8-TCDF	(ng/kg)																
1,2,3,7,8-PeCDF	(ng/kg)																
2,3,4,7,8-PeCDF	(ng/kg)																
1,2,3,4,7,8-HxCDF	(ng/kg)																
1,2,3,6,7,8-HxCDF	(ng/kg)																
2,3,4,6,7,8-HxCDF	(ng/kg)																
1,2,3,7,8,9-HxCDF	(ng/kg)																
1,2,3,4,6,7,8-HpCDF	(ng/kg)																
1,2,3,4,7,8,9-HpCDF	(ng/kg)																
OCDF	(ng/kg)																
TCDDs (total)	(ng/kg)																
PeCDDs (total)	(ng/kg)																
HxCDDs (Total)	(ng/kg)																
HpCDDs (total)	(ng/kg)																
TCDFs (total)	(ng/kg)																
PeCDFs (total)	(ng/kg)																
HxCDFs (total)	(ng/kg)																
HpCDFs (total)	(ng/kg)																
TEQ EMPC (ND=0) 1989	(ng/kg)	16															
TEQ EMPC (ND=0) 1998	(ng/kg)	16															

Table 4.1-4
Detected Concentrations in Subsurface Soil

			B-016-89	B-017-89	GP-001	GP-002	GP-003	GP-004	GP-005	GP-006	GP-007	GP-008	GP-009	GP-010	GP-011	GP-012	GP-013	GP-014
		EPA Region IX	1/10/1989	1/10/1989	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/3/1999	2/2/1999	2/3/1999	2/2/1999	2/2/1999
		PRG for	5-7	5-7	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	6-8
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																		
Benzene	(ug/kg)	1300																
Toluene	(ug/kg)	220000	39.84															
Xylenes (total)	(ug/kg)	90000																
SVOCs																		
Benzaldehyde	(ug/kg)	6200000																
Phenol	(ug/kg)	37000000																
2-Chlorophenol	(ug/kg)	24000																
2-Methylphenol	(ug/kg)	3100000																
4-Methylphenol	(ug/kg)	310000																
2-Nitrophenol	(ug/kg)																	
2,4-Dimethylphenol	(ug/kg)	1200000		200														
2,4-Dichlorophenol	(ug/kg)	180000																
Naphthalene	(ug/kg)	19000															10000	
4-Chloro-3-methylphenol	(ug/kg)																	
2-Methylnaphthalene	(ug/kg)								310								65000	
2,4,6-Trichlorophenol	(ug/kg)	6200																
2,4,5-Trichlorophenol	(ug/kg)	6200000																
Biphenyl	(ug/kg)	350000																
Acenaphthylene	(ug/kg)																	
Acenaphthene	(ug/kg)	2900000															2700	3100
2,4-Dinitrophenol	(ug/kg)	120000																
4-Nitrophenol	(ug/kg)																	
2,3,5,6-Tetrachlorophenol	(ug/kg)		368.89															
Dibenzofuran	(ug/kg)	310000																
Fluorene	(ug/kg)	2600000															3400	1800
4,6-Dinitro-2-methylphenol	(ug/kg)																	
Pentachlorophenol	(ug/kg)	9000												1300		2200	[1100000]	[22000]
Phenanthrene	(ug/kg)								550								26000	1800
Anthracene	(ug/kg)	24000000															440	1200
Fluoranthene	(ug/kg)	2200000							770								1300	5600
Pyrene	(ug/kg)	2900000							640								2300	6000
Benzo(a)anthracene	(ug/kg)	2100							440									750
Chrysene	(ug/kg)	210000							470								530	680
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000																
Benzo(b)fluoranthene	(ug/kg)	2100							570								350	370
Benzo(k)fluoranthene	(ug/kg)	21000																
Benzo(a)pyrene	(ug/kg)	210							[360]									[400]
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100							310									
Benzo(g,h,i)perylene	(ug/kg)								280									
Metals																		
Aluminum	(mg/kg)	92000																
Antimony	(mg/kg)	41																
Arsenic	(mg/kg)	1.6	1.3											[170]		[540]		
Barium	(mg/kg)	6700																
Beryllium	(mg/kg)	1900																
Cadmium	(mg/kg)	45																
Calcium	(mg/kg)																	
Chromium(total)	(mg/kg)	450	10.6	10.6	7	7.2	8.2	12	23	38	9.2	8.1	9	96	16	[530]	13	6
Cobalt	(mg/kg)	1900																
Copper	(mg/kg)	4100	13	12.8	40	8.2	13	15	150	14	7.4	8	7.3	15	17	120	7.6	11
Iron	(mg/kg)	31000																
Lead	(mg/kg)	75																
Magnesium	(mg/kg)																	
Manganese	(mg/kg)	1900																
Mercury	(mg/kg)	31																
Nickel	(mg/kg)	2000																
Potassium	(mg/kg)																	

Table 4.1-4
Detected Concentrations in Subsurface Soil

			B-016-89	B-017-89	GP-001	GP-002	GP-003	GP-004	GP-005	GP-006	GP-007	GP-008	GP-009	GP-010	GP-011	GP-012	GP-013	GP-014
		EPA Region IX	1/10/1989	1/10/1989	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/3/1999	2/2/1999	2/3/1999	2/2/1999	2/2/1999
		PRG for	5-7	5-7	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	6-8
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Selenium	(mg/kg)	510																
Silver	(mg/kg)	510																
Sodium	(mg/kg)																	
Vanadium	(mg/kg)	720																
Zinc	(mg/kg)	31000																
Dioxin																		
2,3,7,8-TCDD	(ng/kg)	16																
1,2,3,7,8-PeCDD	(ng/kg)																	
1,2,3,4,7,8-HxCDD	(ng/kg)																	
1,2,3,6,7,8-HxCDD	(ng/kg)																	
1,2,3,7,8,9-HxCDD	(ng/kg)																	
1,2,3,4,6,7,8-HpCDD	(ng/kg)																	
OCDD	(ng/kg)																	
2,3,7,8-TCDF	(ng/kg)																	
1,2,3,7,8-PeCDF	(ng/kg)																	
2,3,4,7,8-PeCDF	(ng/kg)																	
1,2,3,4,7,8-HxCDF	(ng/kg)																	
1,2,3,6,7,8-HxCDF	(ng/kg)																	
2,3,4,6,7,8-HxCDF	(ng/kg)																	
1,2,3,7,8,9-HxCDF	(ng/kg)																	
1,2,3,4,6,7,8-HpCDF	(ng/kg)																	
1,2,3,4,7,8,9-HpCDF	(ng/kg)																	
OCDF	(ng/kg)																	
TCDDs (total)	(ng/kg)																	
PeCDDs (total)	(ng/kg)																	
HxCDDs (Total)	(ng/kg)																	
HpCDDs (total)	(ng/kg)																	
TCDFs (total)	(ng/kg)																	
PeCDFs (total)	(ng/kg)																	
HxCDFs (total)	(ng/kg)																	
HpCDFs (total)	(ng/kg)																	
TEQ EMPC (ND=0) 1989	(ng/kg)	16																
TEQ EMPC (ND=0) 1998	(ng/kg)	16																

Table 4.1-4
Detected Concentrations in Subsurface Soil

			GP-015	GP-016	GP-017	GP-018	GP-019	GP-020	GP-021	GP-022	GP-023	GP-024	GP-025	GP-025	GP-026	GP-027	GP-028	GP-028
		EPA Region IX	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/4/1999	2/4/1999	2/4/1999	2/4/1999	2/3/1999	2/3/1999	2/3/1999	2/4/1999	2/3/1999	2/3/1999	2/3/1999
		PRG for	6-8	6-8	6-8	6-8	6-8	2-4	2-4	2-4	2-4	2-4	2-4	6-8	4-6	2-4	2-4	6-8
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																		
Benzene	(ug/kg)	1300																
Toluene	(ug/kg)	220000																
Xylenes (total)	(ug/kg)	90000																
SVOCs																		
Benzaldehyde	(ug/kg)	6200000																
Phenol	(ug/kg)	37000000																
2-Chlorophenol	(ug/kg)	24000																
2-Methylphenol	(ug/kg)	3100000																
4-Methylphenol	(ug/kg)	310000																
2-Nitrophenol	(ug/kg)																	
2,4-Dimethylphenol	(ug/kg)	1200000																
2,4-Dichlorophenol	(ug/kg)	180000																
Naphthalene	(ug/kg)	19000																970
4-Chloro-3-methylphenol	(ug/kg)																	
2-Methylnaphthalene	(ug/kg)																	3500
2,4,6-Trichlorophenol	(ug/kg)	6200																
2,4,5-Trichlorophenol	(ug/kg)	6200000																
Biphenyl	(ug/kg)	350000																
Acenaphthylene	(ug/kg)																	
Acenaphthene	(ug/kg)	2900000																1100
2,4-Dinitrophenol	(ug/kg)	120000																
4-Nitrophenol	(ug/kg)																	
2,3,5,6-Tetrachlorophenol	(ug/kg)																	
Dibenzofuran	(ug/kg)	310000																
Fluorene	(ug/kg)	2600000		470										330				1600
4,6-Dinitro-2-methylphenol	(ug/kg)																	
Pentachlorophenol	(ug/kg)	9000	3600	[11000]	[12000]	330			2900			3300	[16000]	[260000]		1100		[710000]
Phenanthrene	(ug/kg)													410				1700
Anthracene	(ug/kg)	24000000																890
Fluoranthene	(ug/kg)	2200000		2700														500
Pyrene	(ug/kg)	2900000		5000										800				1300
Benzo(a)anthracene	(ug/kg)	2100		800														
Chrysene	(ug/kg)	210000		760														
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000																
Benzo(b)fluoranthene	(ug/kg)	2100		510														
Benzo(k)fluoranthene	(ug/kg)	21000																
Benzo(a)pyrene	(ug/kg)	210		[560]														
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100																
Benzo(g,h,i)perylene	(ug/kg)																	
Metals																		
Aluminum	(mg/kg)	92000																
Antimony	(mg/kg)	41																
Arsenic	(mg/kg)	1.6	[17]		[87]												[17]	
Barium	(mg/kg)	6700																
Beryllium	(mg/kg)	1900																
Cadmium	(mg/kg)	45																
Calcium	(mg/kg)																	
Chromium(total)	(mg/kg)	450	17	80	20	11	6	11	13	10	9	12	13	12	9.9	11	9	12
Cobalt	(mg/kg)	1900																
Copper	(mg/kg)	4100	11	8.6	29	8.8	13	12	20	10	25	8.6	7.7	4.8	42	11	10	4.3
Iron	(mg/kg)	31000																
Lead	(mg/kg)	75																
Magnesium	(mg/kg)																	
Manganese	(mg/kg)	1900																
Mercury	(mg/kg)	31																
Nickel	(mg/kg)	2000																
Potassium	(mg/kg)																	

Table 4.1-4
Detected Concentrations in Subsurface Soil

			GP-015	GP-016	GP-017	GP-018	GP-019	GP-020	GP-021	GP-022	GP-023	GP-024	GP-025	GP-025	GP-026	GP-027	GP-028	GP-028
		EPA Region IX	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/2/1999	2/4/1999	2/4/1999	2/4/1999	2/4/1999	2/3/1999	2/3/1999	2/3/1999	2/4/1999	2/3/1999	2/3/1999	2/3/1999
		PRG for	6-8	6-8	6-8	6-8	6-8	2-4	2-4	2-4	2-4	2-4	2-4	6-8	4-6	2-4	2-4	6-8
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Selenium	(mg/kg)	510																
Silver	(mg/kg)	510																
Sodium	(mg/kg)																	
Vanadium	(mg/kg)	720																
Zinc	(mg/kg)	31000																
Dioxin																		
2,3,7,8-TCDD	(ng/kg)	16																
1,2,3,7,8-PeCDD	(ng/kg)																	
1,2,3,4,7,8-HxCDD	(ng/kg)																	
1,2,3,6,7,8-HxCDD	(ng/kg)																	
1,2,3,7,8,9-HxCDD	(ng/kg)																	
1,2,3,4,6,7,8-HpCDD	(ng/kg)																	
OCDD	(ng/kg)																	
2,3,7,8-TCDF	(ng/kg)																	
1,2,3,7,8-PeCDF	(ng/kg)																	
2,3,4,7,8-PeCDF	(ng/kg)																	
1,2,3,4,7,8-HxCDF	(ng/kg)																	
1,2,3,6,7,8-HxCDF	(ng/kg)																	
2,3,4,6,7,8-HxCDF	(ng/kg)																	
1,2,3,7,8,9-HxCDF	(ng/kg)																	
1,2,3,4,6,7,8-HpCDF	(ng/kg)																	
1,2,3,4,7,8,9-HpCDF	(ng/kg)																	
OCDF	(ng/kg)																	
TCDDs (total)	(ng/kg)																	
PeCDDs (total)	(ng/kg)																	
HxCDDs (Total)	(ng/kg)																	
HpCDDs (total)	(ng/kg)																	
TCDFs (total)	(ng/kg)																	
PeCDFs (total)	(ng/kg)																	
HxCDFs (total)	(ng/kg)																	
HpCDFs (total)	(ng/kg)																	
TEQ EMPC (ND=0) 1989	(ng/kg)	16																
TEQ EMPC (ND=0) 1998	(ng/kg)	16																

Table 4.1-4
Detected Concentrations in Subsurface Soil

			GP-029	GP-029	GP-030	GP-030	GP-031	GP-032	GP-032	GP-033	GP-033	GP-034	GP-034	GP-035	GP-036	GP-037	GP-037	GP-038
		EPA Region IX	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999
		PRG for	2-4	6-8	2-4	4-5	2-4	2-4	4-6	2-4	6-8	2-4	6-8	2-4	2-4	2-4	6-8	2-4
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																		
Benzene	(ug/kg)	1300																
Toluene	(ug/kg)	220000																
Xylenes (total)	(ug/kg)	90000																
SVOCs																		
Benzaldehyde	(ug/kg)	6200000																
Phenol	(ug/kg)	37000000																
2-Chlorophenol	(ug/kg)	24000																
2-Methylphenol	(ug/kg)	3100000																
4-Methylphenol	(ug/kg)	310000																
2-Nitrophenol	(ug/kg)																	
2,4-Dimethylphenol	(ug/kg)	1200000																
2,4-Dichlorophenol	(ug/kg)	180000																
Naphthalene	(ug/kg)	19000																
4-Chloro-3-methylphenol	(ug/kg)																	
2-Methylnaphthalene	(ug/kg)																	
2,4,6-Trichlorophenol	(ug/kg)	6200																
2,4,5-Trichlorophenol	(ug/kg)	6200000																
Biphenyl	(ug/kg)	350000																
Acenaphthylene	(ug/kg)																	
Acenaphthene	(ug/kg)	2900000																
2,4-Dinitrophenol	(ug/kg)	120000																
4-Nitrophenol	(ug/kg)																	
2,3,5,6-Tetrachlorophenol	(ug/kg)																	
Dibenzofuran	(ug/kg)	310000																
Fluorene	(ug/kg)	2600000		280														
4,6-Dinitro-2-methylphenol	(ug/kg)																	
Pentachlorophenol	(ug/kg)	9000		[43000]	1100	850			1000				[33000]					
Phenanthrene	(ug/kg)																	
Anthracene	(ug/kg)	24000000																
Fluoranthene	(ug/kg)	2200000																
Pyrene	(ug/kg)	2900000		300														
Benzo(a)anthracene	(ug/kg)	2100																
Chrysene	(ug/kg)	210000																
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000																
Benzo(b)fluoranthene	(ug/kg)	2100																
Benzo(k)fluoranthene	(ug/kg)	21000																
Benzo(a)pyrene	(ug/kg)	210																
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100																
Benzo(g,h,i)perylene	(ug/kg)																	
Metals																		
Aluminum	(mg/kg)	92000																
Antimony	(mg/kg)	41																
Arsenic	(mg/kg)	1.6										[17]	[50]			[27]	[14]	[14]
Barium	(mg/kg)	6700																
Beryllium	(mg/kg)	1900																
Cadmium	(mg/kg)	45																
Calcium	(mg/kg)																	
Chromium(total)	(mg/kg)	450	3.5	10	7.3	7.9	11	12	16	16	19	5.2	8.2	18	6.1	20	9.1	13
Cobalt	(mg/kg)	1900																
Copper	(mg/kg)	4100	8	11	5.2	6.1	8.9	8.2	7.6	9.3	6.9	5.3	5.7	52	5	18	5.6	9.4
Iron	(mg/kg)	31000																
Lead	(mg/kg)	75																
Magnesium	(mg/kg)																	
Manganese	(mg/kg)	1900																
Mercury	(mg/kg)	31																
Nickel	(mg/kg)	2000																
Potassium	(mg/kg)																	

Table 4.1-4
Detected Concentrations in Subsurface Soil

			GP-029	GP-029	GP-030	GP-030	GP-031	GP-032	GP-032	GP-033	GP-033	GP-034	GP-034	GP-035	GP-036	GP-037	GP-037	GP-038
		EPA Region IX	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999	2/3/1999
		PRG for	2-4	6-8	2-4	4-5	2-4	2-4	4-6	2-4	6-8	2-4	6-8	2-4	2-4	2-4	6-8	2-4
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Selenium	(mg/kg)	510																
Silver	(mg/kg)	510																
Sodium	(mg/kg)																	
Vanadium	(mg/kg)	720																
Zinc	(mg/kg)	31000																
Dioxin																		
2,3,7,8-TCDD	(ng/kg)	16																
1,2,3,7,8-PeCDD	(ng/kg)																	
1,2,3,4,7,8-HxCDD	(ng/kg)																	
1,2,3,6,7,8-HxCDD	(ng/kg)																	
1,2,3,7,8,9-HxCDD	(ng/kg)																	
1,2,3,4,6,7,8-HpCDD	(ng/kg)																	
OCDD	(ng/kg)																	
2,3,7,8-TCDF	(ng/kg)																	
1,2,3,7,8-PeCDF	(ng/kg)																	
2,3,4,7,8-PeCDF	(ng/kg)																	
1,2,3,4,7,8-HxCDF	(ng/kg)																	
1,2,3,6,7,8-HxCDF	(ng/kg)																	
2,3,4,6,7,8-HxCDF	(ng/kg)																	
1,2,3,7,8,9-HxCDF	(ng/kg)																	
1,2,3,4,6,7,8-HpCDF	(ng/kg)																	
1,2,3,4,7,8,9-HpCDF	(ng/kg)																	
OCDF	(ng/kg)																	
TCDDs (total)	(ng/kg)																	
PeCDDs (total)	(ng/kg)																	
HxCDDs (Total)	(ng/kg)																	
HpCDDs (total)	(ng/kg)																	
TCDFs (total)	(ng/kg)																	
PeCDFs (total)	(ng/kg)																	
HxCDFs (total)	(ng/kg)																	
HpCDFs (total)	(ng/kg)																	
TEQ EMPC (ND=0) 1989	(ng/kg)	16																
TEQ EMPC (ND=0) 1998	(ng/kg)	16																

Table 4.1-4
Detected Concentrations in Subsurface Soil

			GP-039	GP-040	GP-042	GP-042	GP-043	GP-043	GP-044	GP-044	MW-001	MW-002·	MW-003	MW-004	MW-005A	MW-006	MW-007A
											MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
		EPA Region IX	2/3/1999	2/3/1999	2/10/1999	2/10/1999	2/10/1999	2/10/1999	2/10/1999	2/10/1999	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988
		PRG for	2-4	2-4	1-2	4-6	2-4	4-6	1-2	4-6	6-8	6-8	6-8	8-10	6-8	4-8	8-10
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																	
Benzene	(ug/kg)	1300															
Toluene	(ug/kg)	220000															
Xylenes (total)	(ug/kg)	90000										8100	5500		1100	2200	450
SVOCs																	
Benzaldehyde	(ug/kg)	6200000															
Phenol	(ug/kg)	37000000															
2-Chlorophenol	(ug/kg)	24000															
2-Methylphenol	(ug/kg)	3100000															
4-Methylphenol	(ug/kg)	310000															
2-Nitrophenol	(ug/kg)																
2,4-Dimethylphenol	(ug/kg)	1200000															
2,4-Dichlorophenol	(ug/kg)	180000															
Naphthalene	(ug/kg)	19000															
4-Chloro-3-methylphenol	(ug/kg)																
2-Methylnaphthalene	(ug/kg)																
2,4,6-Trichlorophenol	(ug/kg)	6200															
2,4,5-Trichlorophenol	(ug/kg)	6200000															
Biphenyl	(ug/kg)	350000															
Acenaphthylene	(ug/kg)																
Acenaphthene	(ug/kg)	2900000															
2,4-Dinitrophenol	(ug/kg)	120000										55000	91000		46000	39000	24000
4-Nitrophenol	(ug/kg)																
2,3,5,6-Tetrachlorophenol	(ug/kg)																
Dibenzofuran	(ug/kg)	310000															
Fluorene	(ug/kg)	2600000															
4,6-Dinitro-2-methylphenol	(ug/kg)																
Pentachlorophenol	(ug/kg)	9000				[140000]	270	850				[130000]	[270000]	880	[150000]	[310000]	[41000]
Phenanthrene	(ug/kg)																
Anthracene	(ug/kg)	24000000															
Fluoranthene	(ug/kg)	2200000															
Pyrene	(ug/kg)	2900000				490											
Benzo(a)anthracene	(ug/kg)	2100															
Chrysene	(ug/kg)	210000															
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000															
Benzo(b)fluoranthene	(ug/kg)	2100															
Benzo(k)fluoranthene	(ug/kg)	21000															
Benzo(a)pyrene	(ug/kg)	210															
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100															
Benzo(g,h,i)perylene	(ug/kg)																
Metals																	
Aluminum	(mg/kg)	92000															
Antimony	(mg/kg)	41															
Arsenic	(mg/kg)	1.6									[2.6]	[4]	[140]	[2.2]	[2.2]	[1.6]	1.5
Barium	(mg/kg)	6700															
Beryllium	(mg/kg)	1900															
Cadmium	(mg/kg)	45															
Calcium	(mg/kg)																
Chromium(total)	(mg/kg)	450	8.8	5.7	12	14	10	12	18	4.2	8.3	14.5	162	8.2	8.2	11	7.1
Cobalt	(mg/kg)	1900															
Copper	(mg/kg)	4100	10	9.5	9.3	7.7	6.7	7.2	9	8.2	10.4	21.4	58.9	3.9	230	11.5	7.9
Iron	(mg/kg)	31000															
Lead	(mg/kg)	75															
Magnesium	(mg/kg)																
Manganese	(mg/kg)	1900															
Mercury	(mg/kg)	31															
Nickel	(mg/kg)	2000															
Potassium	(mg/kg)																

Table 4.1-4
Detected Concentrations in Subsurface Soil

			GP-039	GP-040	GP-042	GP-042	GP-043	GP-043	GP-044	GP-044	MW-001	MW-002	MW-003	MW-004	MW-005A	MW-006	MW-007A
											MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
		EPA Region IX	2/3/1999	2/3/1999	2/10/1999	2/10/1999	2/10/1999	2/10/1999	2/10/1999	2/10/1999	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988	1/27/1988
		PRG for	2-4	2-4	1-2	4-6	2-4	4-6	1-2	4-6	6-8	6-8	6-8	8-10	6-8	4-8	8-10
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Selenium	(mg/kg)	510															
Silver	(mg/kg)	510															
Sodium	(mg/kg)																
Vanadium	(mg/kg)	720															
Zinc	(mg/kg)	31000															
Dioxin																	
2,3,7,8-TCDD	(ng/kg)	16															
1,2,3,7,8-PeCDD	(ng/kg)																
1,2,3,4,7,8-HxCDD	(ng/kg)																
1,2,3,6,7,8-HxCDD	(ng/kg)																
1,2,3,7,8,9-HxCDD	(ng/kg)																
1,2,3,4,6,7,8-HpCDD	(ng/kg)																
OCDD	(ng/kg)																
2,3,7,8-TCDF	(ng/kg)																
1,2,3,7,8-PeCDF	(ng/kg)																
2,3,4,7,8-PeCDF	(ng/kg)																
1,2,3,4,7,8-HxCDF	(ng/kg)																
1,2,3,6,7,8-HxCDF	(ng/kg)																
2,3,4,6,7,8-HxCDF	(ng/kg)																
1,2,3,7,8,9-HxCDF	(ng/kg)																
1,2,3,4,6,7,8-HpCDF	(ng/kg)																
1,2,3,4,7,8,9-HpCDF	(ng/kg)																
OCDF	(ng/kg)																
TCDDs (total)	(ng/kg)																
PeCDDs (total)	(ng/kg)																
HxCDDs (Total)	(ng/kg)																
HpCDDs (total)	(ng/kg)																
TCDFs (total)	(ng/kg)																
PeCDFs (total)	(ng/kg)																
HxCDFs (total)	(ng/kg)																
HpCDFs (total)	(ng/kg)																
TEQ EMPC (ND=0) 1989	(ng/kg)	16															
TEQ EMPC (ND=0) 1998	(ng/kg)	16															

Table 4.1-4
Detected Concentrations in Subsurface Soil

			MW-008B	MW-009B	MW-012	PW-001	RCA-1	RCA-2	RCA-3	RCA-5	RCA-6	RCA-7	RCA-8	RCSB-001	RCSB-002	RCSB-003	RCSB-005
			MW-8B	MW-9B			RCA-1	RCA-2	RCA-3	RCA-5	RCA-6	RCA-7	RCA-8				
		EPA Region IX	1/10/1989	1/10/1989	1/17/1989	1/9/1989	2/3/1999	2/5/1999	2/4/1999	2/5/1999	2/5/1999	2/4/1999	2/3/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999
		PRG for	4-5.5	8-10	6-8	6-8	4-6	4-6	10-12	4-6	4-6	4-6	4-6	4-6	8-10	6-8	6-8
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																	
Benzene	(ug/kg)	1300			109												
Toluene	(ug/kg)	220000															
Xylenes (total)	(ug/kg)	90000			3500												
SVOCs																	
Benzaldehyde	(ug/kg)	6200000															
Phenol	(ug/kg)	37000000															
2-Chlorophenol	(ug/kg)	24000															
2-Methylphenol	(ug/kg)	3100000															
4-Methylphenol	(ug/kg)	310000															
2-Nitrophenol	(ug/kg)																
2,4-Dimethylphenol	(ug/kg)	1200000	2800		350	90											
2,4-Dichlorophenol	(ug/kg)	180000	2300	200	1100	250											
Naphthalene	(ug/kg)	19000															
4-Chloro-3-methylphenol	(ug/kg)																
2-Methylnaphthalene	(ug/kg)																
2,4,6-Trichlorophenol	(ug/kg)	6200															
2,4,5-Trichlorophenol	(ug/kg)	6200000															
Biphenyl	(ug/kg)	350000															
Acenaphthylene	(ug/kg)																
Acenaphthene	(ug/kg)	2900000															
2,4-Dinitrophenol	(ug/kg)	120000															
4-Nitrophenol	(ug/kg)																
2,3,5,6-Tetrachlorophenol	(ug/kg)		11000	1300	4079.92												
Dibenzofuran	(ug/kg)	310000															
Fluorene	(ug/kg)	2600000															
4,6-Dinitro-2-methylphenol	(ug/kg)																
Pentachlorophenol	(ug/kg)	9000				190	890					[54000]					
Phenanthrene	(ug/kg)														280		
Anthracene	(ug/kg)	24000000															
Fluoranthene	(ug/kg)	2200000															
Pyrene	(ug/kg)	2900000															
Benzo(a)anthracene	(ug/kg)	2100															
Chrysene	(ug/kg)	210000															
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000															
Benzo(b)fluoranthene	(ug/kg)	2100															
Benzo(k)fluoranthene	(ug/kg)	21000															
Benzo(a)pyrene	(ug/kg)	210															
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100															
Benzo(g,h,i)perylene	(ug/kg)																
Metals																	
Aluminum	(mg/kg)	92000															
Antimony	(mg/kg)	41															
Arsenic	(mg/kg)	1.6	[5]	1.4	1						[60]	[19]					
Barium	(mg/kg)	6700															
Beryllium	(mg/kg)	1900															
Cadmium	(mg/kg)	45															
Calcium	(mg/kg)																
Chromium(total)	(mg/kg)	450	7.8	14.2	31.1	7.8	9.2	10	9.6	7.8	15	11	38	12	38	6.3	8.7
Cobalt	(mg/kg)	1900															
Copper	(mg/kg)	4100	6.4	8.2	12.2	6.3	78	11	9.3	8	13	12	37	39	17	7	9.3
Iron	(mg/kg)	31000															
Lead	(mg/kg)	75															
Magnesium	(mg/kg)																
Manganese	(mg/kg)	1900															
Mercury	(mg/kg)	31															
Nickel	(mg/kg)	2000															
Potassium	(mg/kg)																

Table 4.1-4
Detected Concentrations in Subsurface Soil

			MW-008B	MW-009B	MW-012	PW-001	RCA-1	RCA-2	RCA-3	RCA-5	RCA-6	RCA-7	RCA-8	RCSB-001	RCSB-002	RCSB-003	RCSB-005
			MW-8B	MW-9B			RCA-1	RCA-2	RCA-3	RCA-5	RCA-6	RCA-7	RCA-8				
		EPA Region IX	1/10/1989	1/10/1989	1/17/1989	1/9/1989	2/3/1999	2/5/1999	2/4/1999	2/5/1999	2/5/1999	2/4/1999	2/3/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999
		PRG for	4-5.5	8-10	6-8	6-8	4-6	4-6	10-12	4-6	4-6	4-6	4-6	4-6	8-10	6-8	6-8
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Selenium	(mg/kg)	510															
Silver	(mg/kg)	510															
Sodium	(mg/kg)																
Vanadium	(mg/kg)	720															
Zinc	(mg/kg)	31000															
Dioxin																	
2,3,7,8-TCDD	(ng/kg)	16															
1,2,3,7,8-PeCDD	(ng/kg)																
1,2,3,4,7,8-HxCDD	(ng/kg)																
1,2,3,6,7,8-HxCDD	(ng/kg)																
1,2,3,7,8,9-HxCDD	(ng/kg)																
1,2,3,4,6,7,8-HpCDD	(ng/kg)																
OCDD	(ng/kg)																
2,3,7,8-TCDF	(ng/kg)																
1,2,3,7,8-PeCDF	(ng/kg)																
2,3,4,7,8-PeCDF	(ng/kg)																
1,2,3,4,7,8-HxCDF	(ng/kg)																
1,2,3,6,7,8-HxCDF	(ng/kg)																
2,3,4,6,7,8-HxCDF	(ng/kg)																
1,2,3,7,8,9-HxCDF	(ng/kg)																
1,2,3,4,6,7,8-HpCDF	(ng/kg)																
1,2,3,4,7,8,9-HpCDF	(ng/kg)																
OCDF	(ng/kg)																
TCDDs (total)	(ng/kg)																
PeCDDs (total)	(ng/kg)																
HxCDDs (Total)	(ng/kg)																
HpCDDs (total)	(ng/kg)																
TCDFs (total)	(ng/kg)																
PeCDFs (total)	(ng/kg)																
HxCDFs (total)	(ng/kg)																
HpCDFs (total)	(ng/kg)																
TEQ EMPC (ND=0) 1989	(ng/kg)	16															
TEQ EMPC (ND=0) 1998	(ng/kg)	16															

Table 4.1-4

Detected Concentrations in Subsurface Soil

			RCSB-006	RCSB-007	RCSB-008	RCSB-009	RCSB-010	RCSB-011	RCSB-012	RCSB-013	RCSB-013	SB-001	SB-001	SB-002	SB-002	SB-002
												D03458	D03459	D03460	MAJF90	MAJF91
		EPA Region IX	3/18/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002
		PRG for	6-8	6-8	6-8	6-8	6-8	6-8	6-8	8-10	8-10	1-4	4-10	1-4	-	1-4
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary
VOCs																
Benzene	(ug/kg)	1300														
Toluene	(ug/kg)	220000														
Xylenes (total)	(ug/kg)	90000														
SVOCs																
Benzaldehyde	(ug/kg)	6200000										75J	78J			
Phenol	(ug/kg)	37000000														
2-Chlorophenol	(ug/kg)	24000														
2-Methylphenol	(ug/kg)	3100000														
4-Methylphenol	(ug/kg)	310000														
2-Nitrophenol	(ug/kg)															
2,4-Dimethylphenol	(ug/kg)	1200000														
2,4-Dichlorophenol	(ug/kg)	180000														
Naphthalene	(ug/kg)	19000									1400					
4-Chloro-3-methylphenol	(ug/kg)															
2-Methylnaphthalene	(ug/kg)										680	80J	94J			
2,4,6-Trichlorophenol	(ug/kg)	6200														
2,4,5-Trichlorophenol	(ug/kg)	6200000														
Biphenyl	(ug/kg)	350000														
Acenaphthylene	(ug/kg)											100	140			
Acenaphthene	(ug/kg)	2900000									4200					
2,4-Dinitrophenol	(ug/kg)	120000														
4-Nitrophenol	(ug/kg)															
2,3,5,6-Tetrachlorophenol	(ug/kg)															
Dibenzofuran	(ug/kg)	310000														
Fluorene	(ug/kg)	2600000									6200					
4,6-Dinitro-2-methylphenol	(ug/kg)															
Pentachlorophenol	(ug/kg)	9000								[210000]	[210000]	6900	4500			
Phenanthrene	(ug/kg)										8900	45J				
Anthracene	(ug/kg)	24000000									1500	130	120			
Fluoranthene	(ug/kg)	2200000									1400	55J				
Pyrene	(ug/kg)	2900000									1600	82J	63J			
Benzo(a)anthracene	(ug/kg)	2100														
Chrysene	(ug/kg)	210000										99	150			
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000										59JB	160B			
Benzo(b)fluoranthene	(ug/kg)	2100										110	110			
Benzo(k)fluoranthene	(ug/kg)	21000										110	92J			
Benzo(a)pyrene	(ug/kg)	210											150			
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100										110	130			
Benzo(g,h,i)perylene	(ug/kg)											99	110			
Metals																
Aluminum	(mg/kg)	92000													12400	7920
Antimony	(mg/kg)	41													2.1B	
Arsenic	(mg/kg)	1.6													[47.9]*	[27.5]*
Barium	(mg/kg)	6700													91.3	51.3
Beryllium	(mg/kg)	1900													0.62B	0.37B
Cadmium	(mg/kg)	45													0.12B	
Calcium	(mg/kg)														2250	1400
Chromium(total)	(mg/kg)	450	5.3	17	4.6	13	160	12	8.4	7.4	7.4				236*	111*
Cobalt	(mg/kg)	1900													16.2	3.1B
Copper	(mg/kg)	4100	7.6	9.6	8.2	15	20	15	9.2	5.7	5.7				108N*	43.4N*
Iron	(mg/kg)	31000													25800	14900
Lead	(mg/kg)	75													[271]*	[108]*
Magnesium	(mg/kg)														996B	752B
Manganese	(mg/kg)	1900													376	251
Mercury	(mg/kg)	31													0.6	0.28
Nickel	(mg/kg)	2000													11.6	5.6B
Potassium	(mg/kg)														723B	425B

Table 4.1-4
Detected Concentrations in Subsurface Soil

			RCSB-006	RCSB-007	RCSB-008	RCSB-009	RCSB-010	RCSB-011	RCSB-012	RCSB-013	RCSB-013	SB-001	SB-001	SB-002	SB-002	SB-002
												D03458	D03459	D03460	MAJF90	MAJF91
		EPA Region IX	3/18/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999	3/18/1999	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002
		PRG for	6-8	6-8	6-8	6-8	6-8	6-8	6-8	8-10	8-10	1-4	4-10	1-4	-	1-4
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary
Selenium	(mg/kg)	510													2.8	2.3
Silver	(mg/kg)	510													0.15B	
Sodium	(mg/kg)														225B	163B
Vanadium	(mg/kg)	720													21.7	13.8
Zinc	(mg/kg)	31000													89*E	58.2*E
Dioxin																
2,3,7,8-TCDD	(ng/kg)	16												1.55*		
1,2,3,7,8-PeCDD	(ng/kg)											2.13	4.61	26.6J		
1,2,3,4,7,8-HxCDD	(ng/kg)												36.4	82.2J		
1,2,3,6,7,8-HxCDD	(ng/kg)											714	809	346J		
1,2,3,7,8,9-HxCDD	(ng/kg)											126	170	240J		
1,2,3,4,6,7,8-HpCDD	(ng/kg)											20500J	23800J	8960J		
OCDD	(ng/kg)											113000J	139000J	82900J		
2,3,7,8-TCDF	(ng/kg)													1.65J		
1,2,3,7,8-PeCDF	(ng/kg)													6.81J		
2,3,4,7,8-PeCDF	(ng/kg)													6.93J		
1,2,3,4,7,8-HxCDF	(ng/kg)											225	246	81J		
1,2,3,6,7,8-HxCDF	(ng/kg)											253	303	76.2J		
2,3,4,6,7,8-HxCDF	(ng/kg)													45.7J		
1,2,3,7,8,9-HxCDF	(ng/kg)													4.85J		
1,2,3,4,6,7,8-HpCDF	(ng/kg)											5830J	6230J	1670J		
1,2,3,4,7,8,9-HpCDF	(ng/kg)											793	699	362J		
OCDF	(ng/kg)											31800J	35600J	6290J		
TCDDs (total)	(ng/kg)											2.97J	2.5J	6.81J		
PeCDDs (total)	(ng/kg)											15.6J	22.3J	88.6J		
HxCDDs (Total)	(ng/kg)											2190J	2830J	1590J		
HpCDDs (total)	(ng/kg)											35600J	40900J	16800J		
TCDFs (total)	(ng/kg)											1.42J	141J	166J		
PeCDFs (total)	(ng/kg)											1920J	2390J	404J		
HxCDFs (total)	(ng/kg)											2470J	3450J	2870J		
HpCDFs (total)	(ng/kg)											21800J	25400J	10000J		
TEQ EMPC (ND=0) 1989	(ng/kg)	16										[550]J	[640]J	[300]J		
TEQ EMPC (ND=0) 1998	(ng/kg)	16										[420]J	[480]J	[240]J		

Table 4.1-4
Detected Concentrations in Subsurface Soil

			SB-002	SB-003	SB-003	SB-003	SB-003	SB-003	SB-003	SB-003	SB-004	SB-004	SB-004	SB-004	SB-005	SB-005
			D03461	D03462	MAJF92	D03528	MAJF94	MAJF93	MAJF95	D03463	D03464	MAJF96	MAJF97	D03465	D03466	D03467
		EPA Region IX	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002
		PRG for	4-10	1-4	-	1-4	-	1-4	1-4	4-10	1-4	-	1-4	4-10	1-4	4-10
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Duplicate 1	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																
Benzene	(ug/kg)	1300														
Toluene	(ug/kg)	220000														
Xylenes (total)	(ug/kg)	90000														
SVOCs																
Benzaldehyde	(ug/kg)	6200000		110		140										
Phenol	(ug/kg)	37000000														
2-Chlorophenol	(ug/kg)	24000														
2-Methylphenol	(ug/kg)	3100000														
4-Methylphenol	(ug/kg)	310000														
2-Nitrophenol	(ug/kg)															
2,4-Dimethylphenol	(ug/kg)	1200000														
2,4-Dichlorophenol	(ug/kg)	180000														
Naphthalene	(ug/kg)	19000		92J		130				370J						
4-Chloro-3-methylphenol	(ug/kg)															
2-Methylnaphthalene	(ug/kg)			93J		130				5600						
2,4,6-Trichlorophenol	(ug/kg)	6200														
2,4,5-Trichlorophenol	(ug/kg)	6200000														
Biphenyl	(ug/kg)	350000								590						
Acenaphthylene	(ug/kg)			66J		75J										
Acenaphthene	(ug/kg)	2900000								620						
2,4-Dinitrophenol	(ug/kg)	120000														
4-Nitrophenol	(ug/kg)															
2,3,5,6-Tetrachlorophenol	(ug/kg)			150J		160J										
Dibenzofuran	(ug/kg)	310000				53J										
Fluorene	(ug/kg)	2600000								1100						
4,6-Dinitro-2-methylphenol	(ug/kg)															
Pentachlorophenol	(ug/kg)	9000		[9600]		[9700]				3200						
Phenanthrene	(ug/kg)			270		310				2500						
Anthracene	(ug/kg)	24000000		62J		77J										
Fluoranthene	(ug/kg)	2200000		420		460										
Pyrene	(ug/kg)	2900000		350		420										
Benzo(a)anthracene	(ug/kg)	2100		150		180										
Chrysene	(ug/kg)	210000		290		330										
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000		58JB		61JB										
Benzo(b)fluoranthene	(ug/kg)	2100		230		280										
Benzo(k)fluoranthene	(ug/kg)	21000		230		260										
Benzo(a)pyrene	(ug/kg)	210		150		180										
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100		81J		88J										
Benzo(g,h,i)perylene	(ug/kg)			64J		73J										
Metals																
Aluminum	(mg/kg)	92000			8030		8140	4880	5810			6290	4190			
Antimony	(mg/kg)	41			5.2JEB		5.3JEB	3.8JEB	2.8JEB			0.96B				
Arsenic	(mg/kg)	1.6			[30]		[34.1]	[14.2]	[16.8]			[8.4]*	[4.9]*			
Barium	(mg/kg)	6700			62.5		65.8	36	51			46.6	25.7B			
Beryllium	(mg/kg)	1900			0.47		0.53					0.36B	0.21B			
Cadmium	(mg/kg)	45														
Calcium	(mg/kg)				5520J		3300J	1660	1760			2420	1470			
Chromium(total)	(mg/kg)	450			81.5		93.8	33.6	34.4			44.6*	10.9*			
Cobalt	(mg/kg)	1900			37.4		46	3.3	3.4			51.7	4.5B			
Copper	(mg/kg)	4100			82.1		84.2	45.5	39.4			120N*	35.5N*			
Iron	(mg/kg)	31000			21600		25200	15300	14700			23200	18000			
Lead	(mg/kg)	75			[193]		[235]	[132]	[123]			[139]*	[78.4]*			
Magnesium	(mg/kg)				1750		1810	1460	1480			2280	1740			
Manganese	(mg/kg)	1900			264		289	193	204			270	191			
Mercury	(mg/kg)	31			0.14		0.15	0.099	0.066J			0.47	0.17			
Nickel	(mg/kg)	2000			13.8		16.4	6.3	5.6			18	6.6B			
Potassium	(mg/kg)				578J		594J	292J	407J			598B	319B			

Table 4.1-4
Detected Concentrations in Subsurface Soil

			SB-002	SB-003	SB-003	SB-003	SB-003	SB-003	SB-003	SB-003	SB-004	SB-004	SB-004	SB-004	SB-005	SB-005
			D03461	D03462	MAJF92	D03528	MAJF94	MAJF93	MAJF95	D03463	D03464	MAJF96	MAJF97	D03465	D03466	D03467
		EPA Region IX	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/14/2002
		PRG for	4-10	1-4	-	1-4	-	1-4	1-4	4-10	1-4	-	1-4	4-10	1-4	4-10
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Duplicate 1	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Selenium	(mg/kg)	510			1.4		1.9	0.83J	0.87J			1.6	1.6			
Silver	(mg/kg)	510														
Sodium	(mg/kg)											205B	149B			
Vanadium	(mg/kg)	720			19.8		21.2	13.1	13.6			16.9	11.2			
Zinc	(mg/kg)	31000			50.4		56.8	37.1	37.6			45.5E*	32.7*E			
Dioxin																
2,3,7,8-TCDD	(ng/kg)	16		1.36		1.51								7.69J		
1,2,3,7,8-PeCDD	(ng/kg)			27.2		32.7				3.85J				18.3J		
1,2,3,4,7,8-HxCDD	(ng/kg)		4.57	83.1		128				15.5J				5.4J		
1,2,3,6,7,8-HxCDD	(ng/kg)		13.7	534		665				572J	3.4			31.3J		
1,2,3,7,8,9-HxCDD	(ng/kg)		10.5J	269		296				83J	2.33			18.1J		
1,2,3,4,6,7,8-HpCDD	(ng/kg)		504J	14700J		17300J				25300J	93.3JEB			168JEB	19.7J	9.4J
OCDD	(ng/kg)		5610J	146000J		156000J				205000J	930J			1290J	143J	90.3J
2,3,7,8-TCDF	(ng/kg)			0.879J		1.65				22.1J	0.759J			14.4J		
1,2,3,7,8-PeCDF	(ng/kg)			3.43		3.92				18.1J				13.5J		
2,3,4,7,8-PeCDF	(ng/kg)			10J		10.1J				43.3J				53.2J	0.132*	
1,2,3,4,7,8-HxCDF	(ng/kg)		3.87*	176		169				248J	1.84*			95.6J		
1,2,3,6,7,8-HxCDF	(ng/kg)		3.81*	730		648				116J	1.54*			26.7J		
2,3,4,6,7,8-HxCDF	(ng/kg)		2.46*	95.7		63.6				117J	0.563*			14.9J		
1,2,3,7,8,9-HxCDF	(ng/kg)									5.42J						
1,2,3,4,6,7,8-HpCDF	(ng/kg)		100J	2780J		3160J				3900J	14.6J			112J		
1,2,3,4,7,8,9-HpCDF	(ng/kg)		10.9*	635J		374J				209J				23.2J		
OCDF	(ng/kg)		599J	15100J		16300J				20700	39J			162J		
TCDDs (total)	(ng/kg)			11.1J		24.7J				23.9J				240J		
PeCDDs (total)	(ng/kg)		0.83J	72.8J		84.4J				98.9J				279J		
HxCDDs (Total)	(ng/kg)		61.7J	2110J		2430J				1710J	18.8J			233J	2.23J	1.05J
HpCDDs (total)	(ng/kg)		852J	27500J		31100J				43600J	172J			273J	32.4J	16.1J
TCDFs (total)	(ng/kg)		11.3J	925J		1270J				306J				506J		0.363J
PeCDFs (total)	(ng/kg)		17.3J	2900J		3130J				424J	9.04J			439J	3.24J	1.58J
HxCDFs (total)	(ng/kg)		119J	14800J		13400J				6440J	29.2J			345J	6.75J	8.85J
HpCDFs (total)	(ng/kg)		475J	8920J		27100J				17100J	51.1J			237J	20.8J	10.2J
TEQ EMPC (ND=0) 1989	(ng/kg)	16	[16]J	[550]J		[600]J				[660]J	3.1J			[69]J	0.41J	0.18J
TEQ EMPC (ND=0) 1998	(ng/kg)	16	11J	[420]J		[460]J				[460]J	2.2J			[77]J	0.28J	0.1J

Table 4.1-4
Detected Concentrations in Subsurface Soil

			SB-006	SB-006	SB-006	SB-006	SB-007	SB-007	SB-008	SB-008	SB-008	SB-008	SB-009	SB-009	SB-010	SB-010
			D03468	MAJF98	MAJF99	D03469	D03470	D03471	D03472	MAJG00	MANH09	D03473	D03474	D03475	D03476	MANH10
		EPA Region IX	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002
		PRG for	1-4	-	1-4	4-10	1-4	4-10	1-4	-	1-4	4-10	1-4	4-10	1-4	-
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																
Benzene	(ug/kg)	1300														
Toluene	(ug/kg)	220000														
Xylenes (total)	(ug/kg)	90000														
SVOCs																
Benzaldehyde	(ug/kg)	6200000													140	
Phenol	(ug/kg)	37000000														
2-Chlorophenol	(ug/kg)	24000														
2-Methylphenol	(ug/kg)	3100000														
4-Methylphenol	(ug/kg)	310000														
2-Nitrophenol	(ug/kg)															
2,4-Dimethylphenol	(ug/kg)	1200000														
2,4-Dichlorophenol	(ug/kg)	180000														
Naphthalene	(ug/kg)	19000													99J	
4-Chloro-3-methylphenol	(ug/kg)															
2-Methylnaphthalene	(ug/kg)														170	
2,4,6-Trichlorophenol	(ug/kg)	6200														
2,4,5-Trichlorophenol	(ug/kg)	6200000														
Biphenyl	(ug/kg)	350000														
Acenaphthylene	(ug/kg)															
Acenaphthene	(ug/kg)	2900000														
2,4-Dinitrophenol	(ug/kg)	120000														
4-Nitrophenol	(ug/kg)															
2,3,5,6-Tetrachlorophenol	(ug/kg)															
Dibenzofuran	(ug/kg)	310000														
Fluorene	(ug/kg)	2600000														
4,6-Dinitro-2-methylphenol	(ug/kg)															
Pentachlorophenol	(ug/kg)	9000													1300	
Phenanthrene	(ug/kg)														170	
Anthracene	(ug/kg)	24000000														
Fluoranthene	(ug/kg)	2200000													82J	
Pyrene	(ug/kg)	2900000													73J	
Benzo(a)anthracene	(ug/kg)	2100														
Chrysene	(ug/kg)	210000													84J	
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000													62JB	
Benzo(b)fluoranthene	(ug/kg)	2100														
Benzo(k)fluoranthene	(ug/kg)	21000														
Benzo(a)pyrene	(ug/kg)	210														
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100														
Benzo(g,h,i)perylene	(ug/kg)															
Metals																
Aluminum	(mg/kg)	92000		5730	4390					5880	3000					5740
Antimony	(mg/kg)	41		7.5B	24.6					2.7B	1.4B					1.9JEB
Arsenic	(mg/kg)	1.6		[18.4]*	[10.1]*					[12.5]*	[6.2]*					[55.1]
Barium	(mg/kg)	6700		124	74.1					132	71.2					56
Beryllium	(mg/kg)	1900		0.51B	0.38B					4	1.9					
Cadmium	(mg/kg)	45														
Calcium	(mg/kg)			2580	2290					1000B	506B					621J
Chromium(total)	(mg/kg)	450		34.7*	9.4*					44.6*	12.7*					42.1
Cobalt	(mg/kg)	1900		41.1	4.7B					20.5	3B					37.7
Copper	(mg/kg)	4100		118N*	57.6N*					239N*	54.8N*					37.6
Iron	(mg/kg)	31000		[31000]	19600					30100	18600					[31100]
Lead	(mg/kg)	75		[361]*	[210]*					[710]*	[165]*					40.9
Magnesium	(mg/kg)			931B	927B					594B	285B					1440
Manganese	(mg/kg)	1900		249	208					142	68.3					153
Mercury	(mg/kg)	31		4.6	1.2					0.3						0.074J
Nickel	(mg/kg)	2000		13.5	5.9B					49.6	14					9.9
Potassium	(mg/kg)			510B	441B					475B	252B					451J

Table 4.1-4
Detected Concentrations in Subsurface Soil

			SB-006	SB-006	SB-006	SB-006	SB-007	SB-007	SB-008	SB-008	SB-008	SB-008	SB-009	SB-009	SB-010	SB-010
			D03468	MAJF98	MAJF99	D03469	D03470	D03471	D03472	MAJG00	MANH09	D03473	D03474	D03475	D03476	MANH10
		EPA Region IX	11/14/2002	11/14/2002	11/14/2002	11/14/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002
		PRG for	1-4	-	1-4	4-10	1-4	4-10	1-4	-	1-4	4-10	1-4	4-10	1-4	-
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Selenium	(mg/kg)	510		3.6	2.1					3.6	2.3					6.3
Silver	(mg/kg)	510		0.15B						0.29B						
Sodium	(mg/kg)			2650	1880					616B	287B					
Vanadium	(mg/kg)	720		18.6	12.3					19.6	11B					28.7
Zinc	(mg/kg)	31000		2160*E	1520*E					345*E	110*E					24.7J
Dioxin																
2,3,7,8-TCDD	(ng/kg)	16	7.87					1.45								
1,2,3,7,8-PeCDD	(ng/kg)		19.9					9.05J	1.79J						6.27	
1,2,3,4,7,8-HxCDD	(ng/kg)		10.2					8.31							18.8	
1,2,3,6,7,8-HxCDD	(ng/kg)		48					9.65	13						274	
1,2,3,7,8,9-HxCDD	(ng/kg)		37.6					11.9	6.74						52.2	
1,2,3,4,6,7,8-HpCDD	(ng/kg)		460J			1.85JEB	90.1	38	452			5.75	225	165	7310J	
OCDD	(ng/kg)		3030J				493J		4110J			60.9J	2110J	1660J	53100J	
2,3,7,8-TCDF	(ng/kg)		17.6					4.2	1.12						0.967	
1,2,3,7,8-PeCDF	(ng/kg)		16.1					11.7	2.58						2.77	
2,3,4,7,8-PeCDF	(ng/kg)		110J					2.83J	1.69J						3.99J	
1,2,3,4,7,8-HxCDF	(ng/kg)		125					23.5	9.9						117	
1,2,3,6,7,8-HxCDF	(ng/kg)		28.2					8.49	6.01				3.63	5.51	455	
2,3,4,6,7,8-HxCDF	(ng/kg)		20.1												43.4	
1,2,3,7,8,9-HxCDF	(ng/kg)														16	
1,2,3,4,6,7,8-HpCDF	(ng/kg)		177J				33.7	28.4	77.9				45	31.8	1430J	
1,2,3,4,7,8,9-HpCDF	(ng/kg)		43.7						7.56				5.21		200	
OCDF	(ng/kg)		347J				93.6		275				142	109	6290J	
TCDDs (total)	(ng/kg)		270J					69.7J	5.93J				3.64J			
PeCDDs (total)	(ng/kg)		330J				2.78J	102J	9.19J						19.3J	
HxCDDs (Total)	(ng/kg)		366J				17.9J	101J	52.9J				27.9J	19.1J	801J	
HpCDDs (total)	(ng/kg)		714J			3.09J	140JEB	64.4JEB	711JEB			14.8JEB	376JEB	273JEB	12800J	
TCDFs (total)	(ng/kg)		612J				3.73J	64.8J	32.1J			0.916J	5.16J	1.08J	271J	
PeCDFs (total)	(ng/kg)		561J				7.83JEB	54.4JEB	41.4JEB			1.28JEB	16.6JEB	20.8JEB	1970J	
HxCDFs (total)	(ng/kg)		403J				42.4J	54.5J	130J			5.07J	77.4J	89J	9680J	
HpCDFs (total)	(ng/kg)		430J				105J	37.9J	288J				188J	136J	12900J	
TEQ EMPC (ND=0) 1989	(ng/kg)	16	[110]J			0.018J	1.8J	15J	15J			0.12J	5.4J	4.3J	[250]J	
TEQ EMPC (ND=0) 1998	(ng/kg)	16	[120]J			0.018J	1.3J	[20]J	12J			0.064J	3.3J	2.7J	[200]J	

Table 4.1-4
Detected Concentrations in Subsurface Soil

			SB-010	SB-010	SB-010	SB-010	SB-011	SB-011	SB-012	SB-012	SB-012	SB-012
			MANH11	D03477	MANH12	MANH13	D03478	D03479	D03481	D03480	MANH14	MANH15
		EPA Region IX	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002
		PRG for	1-4	4-10	-	4-10	1-4	4-10	4-10	1-4	-	1-4
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs												
Benzene	(ug/kg)	1300										
Toluene	(ug/kg)	220000										
Xylenes (total)	(ug/kg)	90000										
SVOCs												
Benzaldehyde	(ug/kg)	6200000								80J		
Phenol	(ug/kg)	37000000										
2-Chlorophenol	(ug/kg)	24000										
2-Methylphenol	(ug/kg)	3100000										
4-Methylphenol	(ug/kg)	310000										
2-Nitrophenol	(ug/kg)											
2,4-Dimethylphenol	(ug/kg)	1200000										
2,4-Dichlorophenol	(ug/kg)	180000										
Naphthalene	(ug/kg)	19000										
4-Chloro-3-methylphenol	(ug/kg)											
2-Methylnaphthalene	(ug/kg)								780			
2,4,6-Trichlorophenol	(ug/kg)	6200										
2,4,5-Trichlorophenol	(ug/kg)	6200000										
Biphenyl	(ug/kg)	350000										
Acenaphthylene	(ug/kg)											
Acenaphthene	(ug/kg)	2900000							400J			
2,4-Dinitrophenol	(ug/kg)	120000										
4-Nitrophenol	(ug/kg)											
2,3,5,6-Tetrachlorophenol	(ug/kg)			6100					630J			
Dibenzofuran	(ug/kg)	310000										
Fluorene	(ug/kg)	2600000							670			
4,6-Dinitro-2-methylphenol	(ug/kg)											
Pentachlorophenol	(ug/kg)	9000		[490000]					[42000]	680		
Phenanthrene	(ug/kg)								1500			
Anthracene	(ug/kg)	24000000										
Fluoranthene	(ug/kg)	2200000		950								
Pyrene	(ug/kg)	2900000		1400								
Benzo(a)anthracene	(ug/kg)	2100										
Chrysene	(ug/kg)	210000		110J								
bis(2-Ethylhexyl) phthalate	(ug/kg)	120000		59JB						140B		
Benzo(b)fluoranthene	(ug/kg)	2100										
Benzo(k)fluoranthene	(ug/kg)	21000										
Benzo(a)pyrene	(ug/kg)	210										
Indeno(1,2,3-cd)pyrene	(ug/kg)	2100										
Benzo(g,h,i)perylene	(ug/kg)											
Metals												
Aluminum	(mg/kg)	92000	5850		8990	5800					5560	4600
Antimony	(mg/kg)	41										
Arsenic	(mg/kg)	1.6	[35.2]		1.3	1J					[3.5]	[4]
Barium	(mg/kg)	6700	40.5		40.7	34.1					37.8	25.1
Beryllium	(mg/kg)	1900										
Cadmium	(mg/kg)	45										
Calcium	(mg/kg)		525J		1920J	819J					1680J	1240J
Chromium(total)	(mg/kg)	450	14.3		40.5	7.3					43.4	9.1
Cobalt	(mg/kg)	1900	2.6J		42.6	1.5					45.5	4.9
Copper	(mg/kg)	4100	13.6		37.6	3.5					30.6	10.2
Iron	(mg/kg)	31000	23700		12700	9980					19800	14800
Lead	(mg/kg)	75	20.5		8.8	6.3					7.8	6.5
Magnesium	(mg/kg)		2200		2770	1350					2800	2230
Manganese	(mg/kg)	1900	155		190	100					331	239
Mercury	(mg/kg)	31	0.069J									
Nickel	(mg/kg)	2000	4.9		12.7	3.2					16	6.2
Potassium	(mg/kg)		506J		635J	338J					671J	366J

Table 4.1-4
Detected Concentrations in Subsurface Soil

			SB-010	SB-010	SB-010	SB-010	SB-011	SB-011	SB-012	SB-012	SB-012	SB-012
			MANH11	D03477	MANH12	MANH13	D03478	D03479	D03481	D03480	MANH14	MANH15
		EPA Region IX	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002	11/13/2002
		PRG for	1-4	4-10	-	4-10	1-4	4-10	4-10	1-4	-	1-4
CONSTITUENT	UNITS	Industrial Soil	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Selenium	(mg/kg)	510	4.1		0.71J						1.2	
Silver	(mg/kg)	510										
Sodium	(mg/kg)											
Vanadium	(mg/kg)	720	22.5		17.2	10.6					21.2	15.8
Zinc	(mg/kg)	31000	23.2J		39.8	21.4					29.8	22.8
Dioxin												
2,3,7,8-TCDD	(ng/kg)	16		2.97					4.69J	0.996		
1,2,3,7,8-PeCDD	(ng/kg)			20.5			2.67J		21J	7.54		
1,2,3,4,7,8-HxCDD	(ng/kg)			204					74.5J	8.69		
1,2,3,6,7,8-HxCDD	(ng/kg)			3720			12.6		591J	29.6		
1,2,3,7,8,9-HxCDD	(ng/kg)			1360J			8.16		104J	19.7		
1,2,3,4,6,7,8-HpCDD	(ng/kg)			153000J			375	33.5	16000J	769JEB		
OCDD	(ng/kg)			1.08e+006J			3340J	296J	124000J	6460J		
2,3,7,8-TCDF	(ng/kg)			6.09					7.09J	0.537J		
1,2,3,7,8-PeCDF	(ng/kg)			33.2					8.56J	2.26		
2,3,4,7,8-PeCDF	(ng/kg)			52J					29.2J	1.68J		
1,2,3,4,7,8-HxCDF	(ng/kg)			676			7.37		198J	26.1		
1,2,3,6,7,8-HxCDF	(ng/kg)			260			23.3		47.7J	86.8		
2,3,4,6,7,8-HxCDF	(ng/kg)			160			3.81		24.9J	10.4		
1,2,3,7,8,9-HxCDF	(ng/kg)			15.7					2.74J			
1,2,3,4,6,7,8-HpCDF	(ng/kg)			21700J			99.2	11.4	2540J	309J		
1,2,3,4,7,8,9-HpCDF	(ng/kg)			2370			14.3		469J	27.1		
OCDF	(ng/kg)			123000J			251		15400J	962J		
TCDDs (total)	(ng/kg)								164J			
PeCDDs (total)	(ng/kg)			70.7J			4.43J		242J	12.1J		
HxCDDs (Total)	(ng/kg)			14400J			59.1J	4.92J	1730J	120J		
HpCDDs (total)	(ng/kg)			261000J			582JEB	54.2JEB	27500J	1160J		
TCDFs (total)	(ng/kg)			67.3J			20.5J	2.14J	228J	36J		
PeCDFs (total)	(ng/kg)			583J			143JEB	9.54JEB	284J	263J		
HxCDFs (total)	(ng/kg)			29700J			406J	40.7J	3630J	1110J		
HpCDFs (total)	(ng/kg)			180000J			428J	40.3J	23100J	1240J		
TEQ EMPC (ND=0) 1989	(ng/kg)	16		[3700]J			15J	0.74J	[460]J	[42]J		
TEQ EMPC (ND=0) 1998	(ng/kg)	16		[2600]J			13J	0.48J	[350]J	[39]J		

Table 4.2-1
Detected Concentrations in Overburden Ground Water

			MW-002	MW-002	MW-002	MW-003	MW-003	MW-004	MW-004	MW-005A	MW-005A	MW-005A	MW-005B	MW-005B	MW-006	MW-006	MW-007A
			D01856	D04390	D04419	D01857	D04391	D01858	D04392	D01859	D01860	D04393	D01861	D04394	D01862	D04395	D01863
				A18N0	A18Q9		A18N1					A18N3		A18N4		A18N5	
			11/19/2001	12/10/2003	12/10/2003	11/16/2001	12/11/2003	11/13/2001	12/12/2003	11/15/2001	11/15/2001	12/15/2003	11/14/2001	12/11/2003	11/15/2001	12/16/2003	11/15/2001
CONSTITUENT	UNITS	EPA MCLs	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																	
Dichlorodifluoromethane	(ug/l)												0.21				
Vinyl chloride	(ug/l)	2						1.4		0.3	0.29		0.7				
Bromomethane	(ug/l)																
Chloroethane	(ug/l)		0.31J					3.1		1	1.		2.3				0.73
1,1-Dichloroethene	(ug/l)	7						0.38					0.08J				
trans-1,2-Dichloroethene	(ug/l)	100						0.15					0.06J				
1,1-Dichloroethane	(ug/l)							12		5.4	5.3		11				1.7
cis-1,2-Dichloroethene	(ug/l)	70						2.3		0.57	0.56		0.97				0.11
1,1,1-trichloroethane	(ug/l)	200	0.07J					4.8 .		0.29	0.26		0.6				
Cyclohexane	(ug/l)		0.43												0.09J		
Trichloroethene	(ug/l)	5						2.6		0.19	0.18		0.37				
1,2-Dichloroethane	(ug/l)	5						0.14									
Methylcyclohexane	(ug/l)		1.5							0.09J	0.1J				0.22		
4-Methyl-2-pentanone	(ug/l)		5.8														
Ethylbenzene	(ug/l)	700	7.9J												2J		
Xylenes (total)	(ug/l)	10000	60J							2.4	2.5				20		
Styrene	(ug/l)	100	2.4														
Isopropylbenzene	(ug/l)		3.3							0.51	0.52				1.8		0.08J
SVOCs																	
Phenol	(ug/l)																
2-Methylphenol	(ug/l)			0.8J	0.8J											2J	
Acetophenone	(ug/l)																
4-Methylphenol	(ug/l)																
Naphthalene	(ug/l)		94J	35	33		3J			1.7J		2J			27		0.4J
Caprolactam	(ug/l)																
2-Methylnaphthalene	(ug/l)		440J	290	280		20			26J	7.8J	28J			84J	2J	2.4
2,4,6-Trichlorophenol	(ug/l)		5.9J		0.5J												0.5J
2,4,5-Trichlorophenol	(ug/l)		9.8J	9J	9J		0.9J					0.9J	0.64J		2.4J	7J	6.7J
1,1'-Biphenyl	(ug/l)		27J	32	35		2J			3.9J	2.2	3J			6	3J	0.33J
Acenaphthylene	(ug/l)			5J	5J												
Acenaphthene	(ug/l)		39J	60	59		5J			2.5J	2.5	3J			6.6	5J	0.53J
Dibenzofuran	(ug/l)		20J	40	41		3J			2J	1.2	2J			4.8	1J	
Diethylphthalate	(ug/l)																
Fluorene	(ug/l)		30J	34	34		2J			4.1J	2.3J	4J			6.4	4J	
Pentachlorophenol	(ug/l)	1	[3500]J	[930]	[940]	[400]J	[940]	0.28J		[1800]J	[1800]J	[1200]J	[26]	[30]	[5500]J	[9400]J	[5100]J
Phenanthrene	(ug/l)		45J	33	35		3J					4J			6.9	11	
Anthracene	(ug/l)			3J	4J					2.5J	1.8						
Carbazole	(ug/l)			0.8J	0.7J												
Di-n-butylphthalate	(ug/l)																
Fluoranthene	(ug/l)			2J	2J												
Pyrene	(ug/l)		2.4J	2J	2J					0.36J	0.31J				0.31J		
Butylbenzylphthalate	(ug/l)							0.34J					0.37J				0.26J
bis(2-Ethylhexyl) phthalate	(ug/l)	6															
2,3,5,6-Tetrachlorophenol	(ug/l)		91J			2.6J				11J	8.8J		1.5J		200J		50J
Phenols (low)																	
2,4,6-Trichlorophenol	(ug/l)			0.28	0.29		0.042J					0.34		0.16J		0.096J	
2-Chlorophenol	(ug/l)																
Pentachlorophenol	(ug/l)	1		[980]	[1100]		[1400]					[1400]		[8.5]		[8100]	
3,4-Dimethylphenol	(ug/l)															1	
2,3,5,6-Tetrachlorophenol	(ug/l)			27J	24J		40J					39J		1.3		180J	
2,4-Dinitrophenol	(ug/l)																
PAHs (low)																	
Benzo(a)anthracene	(ng/l)			160	140		17									33	
Benzo(a)pyrene	(ng/l)	200		78	75		20									21	
Benzo(b)fluoranthene	(ng/l)			83	78		37									39	
Benzo(k)fluoranthene	(ng/l)			28	22		15									13	
Chrysene	(ng/l)			160	140		47									30	

Table 4.2-1
Detected Concentrations in Overburden Ground Water

			MW-002	MW-002	MW-002	MW-003	MW-003	MW-004	MW-004	MW-005A	MW-005A	MW-005A	MW-005B	MW-005B	MW-006	MW-006	MW-007A
			D01856	D04390	D04419	D01857	D04391	D01858	D04392	D01859	D01860	D04393	D01861	D04394	D01862	D04395	D01863
				A18N0	A18Q9		A18N1					A18N3		A18N4		A18N5	
			11/19/2001	12/10/2003	12/10/2003	11/16/2001	12/11/2003	11/13/2001	12/12/2003	11/15/2001	11/15/2001	12/15/2003	11/14/2001	12/11/2003	11/15/2001	12/16/2003	11/15/2001
CONSTITUENT	UNITS	EPA MCLs	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary
Dibenz(a,h) anthracene	(ng/l)			10J	10J												
Indeno(1,2,3-cd)pyrene	(ng/l)			25	22											11	
Naphthalene	(ng/l)			41000	35000							6700					
Metals																	
Aluminum	(ug/l)		32.6J	44.9	43.5	129	152	13.5J		80.4	84.2	85.4	138		789	666	147
Antimony	(ug/l)	6	0.91	0.39B	0.39B	3	2.7							0.42B	1.3	0.96	0.47J
Arsenic	(ug/l)	10	[263]	[161]	[162]	[401]	[940]	2.3	1.8	[33]	[32.9]	[37.3]	[79.8]	[98.6]	[519]	[419]	[14.3]
Barium	(ug/l)	2000	71.5	31.5	31.4	38.1	38.5	31.8	36.3	35.9	35.7	36.9	39.7	54.5	79.9	69.6	117
Beryllium	(ug/l)	4								0.14J	0.14J	0.16B			0.17J	0.14B	
Cadmium	(ug/l)	5				0.47	0.37			0.09J	0.08J	0.11B	0.07J		0.51	1.1	0.24
Calcium	(ug/l)		16800	8000	7970	20600	19800	16100	19400	10400	10500	11000	17700	15500	11900	9930	16700
Chromium(total)	(ug/l)	100	14.8	7.7B	7.6B	4.6J	7.3B			11	10.8	9B	10.4	9.4B	15.9	14.1	3.6J
Cobalt	(ug/l)		10	4.6	5.4	26.1	28.2			3.4	3.5	3.4	3	3.5	11.7	11.8	15.2
Copper	(ug/l)	1300	2.3	2.1	2.2	1.8J	1.2B						1.4J	1.5B	1J	3.2	3
Iron	(ug/l)		26700	10100	10100	749	1110	9940	12500	2500	2510	3120	4140	3360	3310	3410	20500
Lead	(ug/l)	15	0.47	0.54	0.52	0.46	0.32	0.1J		0.14J	0.11J	0.15B	2.3	2.3		0.21	0.58
Magnesium	(ug/l)		823	399	399	2880	2790	2670	3310	1680	1690	1830	2620	2380	1740	1410	2190
Manganese	(ug/l)		2490	1060	1050	3600	3760	631	746	500	503	529	804	756	6000	4680	1460
Nickel	(ug/l)					9.2	17.6B										4.1J
Potassium	(ug/l)		3680	1960	1980	3580	3470	2760	2510	1940	2040	2070	2610	3580	2380	2000	3180
Selenium	(ug/l)	50				0.5J					0.53J						1.1
Sodium	(ug/l)		6240	7520	7480	27800	38600	34300	44600	27500	27600	25000	25500	27000	23000	18600	17400
Thallium	(ug/l)	2				0.27	0.18B										
Vanadium	(ug/l)																
Zinc	(ug/l)		5.1J	5.5B	6.1B	19	24.2			19.2	19.2	18.4B	8.7J	10.9B	13.5	16.7B	34.8
Dioxin																	
2,3,7,8-TCDD	(ng/l)	0.00003								[0.0014]*							
1,2,3,7,8-PeCDD	(ng/l)									0.0204J	0.0129J						
1,2,3,4,7,8-HxCDD	(ng/l)									0.236J	0.138J				0.0342J		
1,2,3,6,7,8-HxCDD	(ng/l)		0.0246*			0.0329J				3.44J	3.34J				0.695J		0.147J
1,2,3,7,8,9-HxCDD	(ng/l)									0.52J	0.315J				0.0778J		0.021J
1,2,3,4,6,7,8-HpCDD	(ng/l)		0.605J			0.889J				109J	106J				22.5J		4.15J
OCDD	(ng/l)		6.28J			6.97J				737J	697J				192J		38J
1,2,3,7,8-PeCDF	(ng/l)									0.0159J	0.0163J						
2,3,4,7,8-PeCDF	(ng/l)									0.0515J	0.0532J				0.011J		
1,2,3,4,7,8-HxCDF	(ng/l)									0.447J	0.438J				0.0996J		0.027J
1,2,3,6,7,8-HxCDF	(ng/l)									0.0839J	0.0967J						
2,3,4,6,7,8-HxCDF	(ng/l)					0.0137J				0.277J	0.207J				0.0645J		0.0163J
1,2,3,7,8,9-HxCDF	(ng/l)									0.089J	0.0719J				0.0222J		
1,2,3,4,6,7,8-HpCDF	(ng/l)		0.181J			0.151J				21.5J	20.2J				3.69J		0.659J
1,2,3,4,7,8,9-HpCDF	(ng/l)		0.0153J			0.0142*				1.06J	0.94J				0.279J		0.0573J
OCDF	(ng/l)		1.42J			0.809J				115J	120J				23.7J		5.06J
TCDDs (total)	(ng/l)									0.0109*	0.0058*						
PeCDDs (total)	(ng/l)									0.0824*	0.0533J						
HxCDDs (Total)	(ng/l)					0.115*				8.66J	7.87J				1.69J		0.383*
HpCDDs (total)	(ng/l)		0.944J			1.34J				159J	154J				34.1J		6.24J
TCDFs (total)	(ng/l)		0.0203J							0.0495*	0.0333*						
PeCDFs (total)	(ng/l)									0.628*	0.424*				0.0681*		
HxCDFs (total)	(ng/l)		0.145*			0.187J				16.9*	16.3J				3.34*		0.618J
HpCDFs (total)	(ng/l)		0.945J			0.686*				120J	119J				19.4J		3.45J
TEQ EMPC (ND=0) 1989	(ng/l)	0.00003	[0.018]J			[0.022]J				[2.7]J	[2.6]J				[0.58]J		[0.11]J
TEQ EMPC (ND=0) 1998	(ng/l)	0.00003	[0.011]J			[0.015]J				[1.9]J	[1.8]J				[0.38]J		[0.072]J

Table 4.2-1
Detected Concentrations in Overburden Ground Water

			MW-007A	MW-007B	MW-007B	MW-008A	MW-008A	MW-009A	MW-010	MW-010	MW-011	MW-012	MW-012	MW-A	MW-G	PZ-001
			D04396	D02002	D04397	D01864	D04398	D01866	D01868	D04401	D01869	D01870	D01871	D04405	D04406	D03559
			A18N6		A18N7		A18N8			A18P1				A18P5	A18P6	
			12/16/2003	11/15/2001	12/16/2003	11/13/2001	12/18/2003	11/16/2001	11/14/2001	12/16/2003	11/16/2001	11/19/2001	11/19/2001	12/15/2003	12/12/2003	12/11/2002
CONSTITUENT	UNITS	EPA MCLs	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary
VOCs																
Dichlorodifluoromethane	(ug/l)			0.12												
Vinyl chloride	(ug/l)	2		0.09J												
Bromomethane	(ug/l)					0.06J										
Chloroethane	(ug/l)			0.62		1			0.34							
1,1-Dichloroethene	(ug/l)	7														
trans-1,2-Dichloroethene	(ug/l)	100														
1,1-Dichloroethane	(ug/l)															
cis-1,2-Dichloroethene	(ug/l)	70		0.26												
1,1,1-trichloroethane	(ug/l)	200		0.2												
Cyclohexane	(ug/l)															
Trichloroethene	(ug/l)	5		0.14												
1,2-Dichloroethane	(ug/l)	5														
Methylcyclohexane	(ug/l)								0.08J			0.24	0.24			
4-Methyl-2-pentanone	(ug/l)															
Ethylbenzene	(ug/l)	700										1.4J	2.2J			
Xylenes (total)	(ug/l)	10000		0.99					1.2			22	22			
Styrene	(ug/l)	100														
Isopropylbenzene	(ug/l)			0.21		0.51			1.3			1.5J	2.2J			
SVOCs																
Phenol	(ug/l)															
2-Methylphenol	(ug/l)													0.7J		
Acetophenone	(ug/l)								0.36J							
4-Methylphenol	(ug/l)													2J		
Naphthalene	(ug/l)			5.3	7J	11			2.4			13			8J	
Caprolactam	(ug/l)						15									
2-Methylnaphthalene	(ug/l)			11	21	5.3						77J			13	
2,4,6-Trichlorophenol	(ug/l)															
2,4,5-Trichlorophenol	(ug/l)		10J	1.9J	3J		1J		0.57J	0.9J				23J	17J	
1,1'-Biphenyl	(ug/l)			1.6J	2J	2			1.3J			5.3		6J	5J	
Acenaphthylene	(ug/l)															
Acenaphthene	(ug/l)		0.6J	1.1J	2J	2.2	0.7J		0.72J			3.9		5J	4J	
Dibenzofuran	(ug/l)			1.2	2J	2.3	1J		1			2.9		2J	3J	
Diethylphthalate	(ug/l)				4J		6JB			0.9J						
Fluorene	(ug/l)			1.8	3J	3	2J		2.2			5.1		5J	4J	
Pentachlorophenol	(ug/l)	1	[2800]J	[2600]J	[1800]	[3700]J	[500]	[20]	[2700]J	[1800]		[3100]J		[5400]	[2600]	
Phenanthrene	(ug/l)			1.6J	4J	5.7	0.5J		0.61J			7.2		4J	3J	
Anthracene	(ug/l)					0.29J	0.5J									
Carbazole	(ug/l)															
Di-n-butylphthalate	(ug/l)				3JB		1JB	0.27J		2JB				4JB		
Fluoranthene	(ug/l)															
Pyrene	(ug/l)					0.26J										
Butylbenzylphthalate	(ug/l)						0.6J	0.48J								
bis(2-Ethylhexyl) phthalate	(ug/l)	6			1JB		1JB			2JB				1JB		
2,3,5,6-Tetrachlorophenol	(ug/l)			24J		40J			23J			27J				
Phenols (low)																
2,4,6-Trichlorophenol	(ug/l)		0.21		0.059J					0.045J				0.1J	0.071J	
2-Chlorophenol	(ug/l)															
Pentachlorophenol	(ug/l)	1	[3500]		[1900]		[460]			[1700]				[5300]	[2200]	
3,4-Dimethylphenol	(ug/l)															
2,3,5,6-Tetrachlorophenol	(ug/l)		53J		55J		23			79J				250J	92J	
2,4-Dinitrophenol	(ug/l)															
PAHs (low)																
Benzo(a)anthracene	(ng/l)						16								15	
Benzo(a)pyrene	(ng/l)	200	13		9.9J		9.7J									
Benzo(b)fluoranthene	(ng/l)		32		12		14							8.7J		
Benzo(k)fluoranthene	(ng/l)		23		13		7.8J									
Chrysene	(ng/l)						18									

Table 4.2-1
Detected Concentrations in Overburden Ground Water

			MW-007A	MW-007B	MW-007B	MW-008A	MW-008A	MW-009A	MW-010	MW-010	MW-011	MW-012	MW-012	MW-A	MW-G	PZ-001
			D04396	D02002	D04397	D01864	D04398	D01866	D01868	D04401	D01869	D01870	D01871	D04405	D04406	D03559
			A18N6		A18N7		A18N8			A18P1				A18P5	A18P6	
			12/16/2003	11/15/2001	12/16/2003	11/13/2001	12/18/2003	11/16/2001	11/14/2001	12/16/2003	11/16/2001	11/19/2001	11/19/2001	12/15/2003	12/12/2003	12/11/2002
CONSTITUENT	UNITS	EPA MCLs	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary
Dibenz(a,h) anthracene	(ng/l)															
Indeno(1,2,3-cd)pyrene	(ng/l)															
Naphthalene	(ng/l)		3900		9500		160			410				30000	6200	
Metals																
Aluminum	(ug/l)		183	700	214	21.8J	31	345	37.8J	540	217	75.5		270	28.2	
Antimony	(ug/l)	6	0.67	1.2J	1.3											
Arsenic	(ug/l)	10	[10.8]	[547]	[573]	3.8	3	0.12J	6.4	[10.2]	0.55	1.1		[39.3]	0.75	0.65
Barium	(ug/l)	2000	63.2	28.6	27.7	29.6	19.5	54.7	11.9	16.7	86	16.6		18.1	13.3	18.6
Beryllium	(ug/l)	4		0.61J	0.41			0.29				0.12J				
Cadmium	(ug/l)	5	0.12B	0.05J		0.14	0.23	0.36			0.2	0.14				
Calcium	(ug/l)		11600	14800	13300	11200	9770	7080	17500	20200	14500	11000		10100	12200	14600
Chromium(total)	(ug/l)	100	2.5B	15.9	10.6											
Cobalt	(ug/l)		9.7	6	5.3	4	5	31.6	8	5.5	2.4	12.1			1.1B	
Copper	(ug/l)	1300	4.4	5	1.1B	1.4J	1.2B	4.3		5.9				1B		
Iron	(ug/l)		15800	5450	4270	14000	13800	27.3J	6250	6850	308	1330		19900	6840	3920
Lead	(ug/l)	15	0.72	1.4J	0.36	0.23		0.21	0.61	1.4	0.32	0.17J		0.43	0.14B	
Magnesium	(ug/l)		2470	2370	2050	1900	1700	1570	3310	3990	2410	1340		2210	2750	2710
Manganese	(ug/l)		1130	4710	3570	3180	1510	1610	688	696	60.1	2410		585	1180	568
Nickel	(ug/l)		3.6B				2.7B	9.2		11.3B	3.3J	3.6J				
Potassium	(ug/l)		2290	1560	1570	4820	4110	1210	784	919	4100	760		522	694	1110
Selenium	(ug/l)	50	1.2B					0.61J								
Sodium	(ug/l)		11000	24400	30000	43400	24700	6550	11900	11100	30800	5430		12300	11900	15000
Thallium	(ug/l)	2														
Vanadium	(ug/l)			3.4J												
Zinc	(ug/l)		29.8	9.5J	6.3B	5.9J	8.8B	34	8J	7.9B	15	5.2J				
Dioxin																
2,3,7,8-TCDD	(ng/l)	0.00003										[0.002]*				
1,2,3,7,8-PeCDD	(ng/l)															
1,2,3,4,7,8-HxCDD	(ng/l)											0.0134J				
1,2,3,6,7,8-HxCDD	(ng/l)					0.0435J						0.226J				
1,2,3,7,8,9-HxCDD	(ng/l)											0.0245J				
1,2,3,4,6,7,8-HpCDD	(ng/l)					1.11J						7.47J				
OCDD	(ng/l)					10.7J						63.9J				
1,2,3,7,8-PeCDF	(ng/l)															
2,3,4,7,8-PeCDF	(ng/l)															
1,2,3,4,7,8-HxCDF	(ng/l)											0.0322J				
1,2,3,6,7,8-HxCDF	(ng/l)															
2,3,4,6,7,8-HxCDF	(ng/l)											0.0213J				
1,2,3,7,8,9-HxCDF	(ng/l)															
1,2,3,4,6,7,8-HpCDF	(ng/l)					0.219J						1.29J				
1,2,3,4,7,8,9-HpCDF	(ng/l)					0.0239J						0.0879J				
OCDF	(ng/l)					1.77J						8.14J				
TCDDs (total)	(ng/l)					0.0066*						0.002*				
PeCDDs (total)	(ng/l)															
HxCDDs (Total)	(ng/l)					0.115J						0.541*				
HpCDDs (total)	(ng/l)					1.68J						11.3J				
TCDFs (total)	(ng/l)															
PeCDFs (total)	(ng/l)											0.0222*				
HxCDFs (total)	(ng/l)					0.182*						1.04J				
HpCDFs (total)	(ng/l)					1.13J						6.58J				
TEQ EMPC (ND=0) 1989	(ng/l)	0.00003				[0.03]J						[0.19]J				
TEQ EMPC (ND=0) 1998	(ng/l)	0.00003				[0.019]J						[0.13]J				

Table 4.2-1
Detected Concentrations in Overburden Ground Water

			PZ-002	PZ-002	PZ-004	PZ-005	PZ-006	PZ-007	PZ-007	PZ-008	PZ-008	PZ-008	RCA-1	RCA-2	RCA-2	RCA-3
			D03560	D04407	D03563	D03564	D03565	D03566	D04408	D03562	D03561	D04409	D04410	RCA - 2	D04411	RCA - 3
				A18P7					A18P8			A18P9	A18Q0			
			12/11/2002	12/13/2003	12/12/2002	12/12/2002	12/12/2002	12/11/2002	12/15/2003	12/10/2002	12/10/2002	12/16/2003	12/11/2003	2/18/1999	12/11/2003	2/19/1999
CONSTITUENT	UNITS	EPA MCLs	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary
VOCs																
Dichlorodifluoromethane	(ug/l)															
Vinyl chloride	(ug/l)	2														
Bromomethane	(ug/l)															
Chloroethane	(ug/l)															
1,1-Dichloroethene	(ug/l)	7														
trans-1,2-Dichloroethene	(ug/l)	100														
1,1-Dichloroethane	(ug/l)															
cis-1,2-Dichloroethene	(ug/l)	70														
1,1,1-trichloroethane	(ug/l)	200														
Cyclohexane	(ug/l)															
Trichloroethene	(ug/l)	5														
1,2-Dichloroethane	(ug/l)	5														
Methylcyclohexane	(ug/l)															
4-Methyl-2-pentanone	(ug/l)															
Ethylbenzene	(ug/l)	700														
Xylenes (total)	(ug/l)	10000														
Styrene	(ug/l)	100														
Isopropylbenzene	(ug/l)															
SVOCs																
Phenol	(ug/l)										0.7J					
2-Methylphenol	(ug/l)											0.8J				
Acetophenone	(ug/l)								3J							
4-Methylphenol	(ug/l)							5J	2J	3J	2J	2J				
Naphthalene	(ug/l)							20		12	10	9J				
Caprolactam	(ug/l)															
2-Methylnaphthalene	(ug/l)							74J		57J	47J	42				
2,4,6-Trichlorophenol	(ug/l)															
2,4,5-Trichlorophenol	(ug/l)									0.7J		1J				
1,1'-Biphenyl	(ug/l)							5	0.7J	5	4J	3J				
Acenaphthylene	(ug/l)															
Acenaphthene	(ug/l)								2J			4J				
Dibenzofuran	(ug/l)							2J		1J	0.8J	2J				
Diethylphthalate	(ug/l)											10				
Fluorene	(ug/l)							4J	1J	4J	4J	3J				
Pentachlorophenol	(ug/l)	1	[4.8]J	[1]J		[30]J	[3]J	[17000]J	[6800]	[4700]J	[4600]J	[4200]	[36]			
Phenanthrene	(ug/l)							7J		6	6	5J				
Anthracene	(ug/l)															
Carbazole	(ug/l)															
Di-n-butylphthalate	(ug/l)								5JB			5JB				
Fluoranthene	(ug/l)															
Pyrene	(ug/l)															
Butylbenzylphthalate	(ug/l)															
bis(2-Ethylhexyl) phthalate	(ug/l)	6						1J	2JB			2JB				
2,3,5,6-Tetrachlorophenol	(ug/l)							580J		350J	340J					
Phenols (low)																
2,4,6-Trichlorophenol	(ug/l)								0.026J			0.042J		11		10
2-Chlorophenol	(ug/l)													11		10
Pentachlorophenol	(ug/l)	1	[4.8]J			[28]J	[3]J	[10000]J	[7200]	[3700]J	[3700]J	[4000]		11		10
3,4-Dimethylphenol	(ug/l)								0.51J			0.88J				
2,3,5,6-Tetrachlorophenol	(ug/l)			0.045J					200J			190J				
2,4-Dinitrophenol	(ug/l)													11		10
PAHs (low)																
Benzo(a)anthracene	(ng/l)												8.8J			
Benzo(a)pyrene	(ng/l)	200		7.4J					13			12				
Benzo(b)fluoranthene	(ng/l)			9.6J					39			10J				
Benzo(k)fluoranthene	(ng/l)								22			10J				
Chrysene	(ng/l)			12												

Table 4.2-1
Detected Concentrations in Overburden Ground Water

			PZ-002	PZ-002	PZ-004	PZ-005	PZ-006	PZ-007	PZ-007	PZ-008	PZ-008	PZ-008	RCA-1	RCA-2	RCA-2	RCA-3
			D03560	D04407	D03563	D03564	D03565	D03566	D04408	D03562	D03561	D04409	D04410	RCA - 2	D04411	RCA - 3
				A18P7					A18P8			A18P9	A18Q0			
			12/11/2002	12/13/2003	12/12/2002	12/12/2002	12/12/2002	12/11/2002	12/15/2003	12/10/2002	12/10/2002	12/16/2003	12/11/2003	2/18/1999	12/11/2003	2/19/1999
CONSTITUENT	UNITS	EPA MCLs	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary
Dibenz(a,h) anthracene	(ng/l)															
Indeno(1,2,3-cd)pyrene	(ng/l)															
Naphthalene	(ng/l)								180			8600				
Metals																
Aluminum	(ug/l)		855	549	179	76		81.6	80.6	402	399	445	65.1		40.6	
Antimony	(ug/l)	6		0.31B	0.73J							0.27B			0.26B	
Arsenic	(ug/l)	10	3.3	1.8	0.72J	2.2J	0.28J	[28]	0.38	1.1J	1J	1	0.73		0.91	
Barium	(ug/l)	2000	33.3	16.2	30.5	12	15.7	30.9	16.2	51.8	52.5	52	56.8		37.4	
Beryllium	(ug/l)	4	0.25	0.26						0.27	0.24	0.21				
Cadmium	(ug/l)	5	0.29J	0.08B	0.086J			0.73J	0.44	0.25J	0.26J	0.3	0.14B			
Calcium	(ug/l)		11800	6360	13600	12600	14500	23500	9060	8130	8260	8150	41600		28100	
Chromium(total)	(ug/l)	100														
Cobalt	(ug/l)		5.7	2.4	1.3J			3.2	3	7	7.1	7.2				
Copper	(ug/l)	1300	1.6J	1.2B	1.8J				1.3B				2.3			
Iron	(ug/l)		7350	5800	2080	13800	3390	83.7J		2540	2590	2240	63B		474	
Lead	(ug/l)	15	0.69	0.46	0.72				0.16B			0.29	0.28		0.16B	
Magnesium	(ug/l)		2140	1140	2470	2580	3410	823	258	1460	1460	1330	1970		1710	
Manganese	(ug/l)		429	219	218	453	822	14600	5320	1360	1380	1160	9.1		180	
Nickel	(ug/l)		4.3J	2.6B								3B				
Potassium	(ug/l)		613	354	2600	800	991	836	646	1280	1220	1190	4600		2100	
Selenium	(ug/l)	50			0.79J								1.1B			
Sodium	(ug/l)		6030	3850	53400	12000	12000	6570	1560	3810	3800	3320	8680		12000	
Thallium	(ug/l)	2														
Vanadium	(ug/l)		2.7J	3.9B												
Zinc	(ug/l)		41.4	21.1	22.3					12.9	13.2	27.7	13.5B			
Dioxin																
2,3,7,8-TCDD	(ng/l)	0.00003														
1,2,3,7,8-PeCDD	(ng/l)															
1,2,3,4,7,8-HxCDD	(ng/l)															
1,2,3,6,7,8-HxCDD	(ng/l)															
1,2,3,7,8,9-HxCDD	(ng/l)															
1,2,3,4,6,7,8-HpCDD	(ng/l)															
OCDD	(ng/l)															
1,2,3,7,8-PeCDF	(ng/l)															
2,3,4,7,8-PeCDF	(ng/l)															
1,2,3,4,7,8-HxCDF	(ng/l)															
1,2,3,6,7,8-HxCDF	(ng/l)															
2,3,4,6,7,8-HxCDF	(ng/l)															
1,2,3,7,8,9-HxCDF	(ng/l)															
1,2,3,4,6,7,8-HpCDF	(ng/l)															
1,2,3,4,7,8,9-HpCDF	(ng/l)															
OCDF	(ng/l)															
TCDDs (total)	(ng/l)															
PeCDDs (total)	(ng/l)															
HxCDDs (Total)	(ng/l)															
HpCDDs (total)	(ng/l)															
TCDFs (total)	(ng/l)															
PeCDFs (total)	(ng/l)															
HxCDFs (total)	(ng/l)															
HpCDFs (total)	(ng/l)															
TEQ EMPC (ND=0) 1989	(ng/l)	0.00003														
TEQ EMPC (ND=0) 1998	(ng/l)	0.00003														

Table 4.2-1
Detected Concentrations in Overburden Ground Water

			RCA-3	RCA-4	RCA-4	RCA-5	RCA-5	RCA-6	RCA-6	RCA-7	RCA-8	RCA-8	RCA-9	RCA-9
			D04412	RCA - 4	D04413	RCA - 5	D04414	RCA - 6	D04415	RCA - 7	RCA - 8	D04417	RCA - 9	D04418
					A18Q3				A18Q5			A18Q7		A18Q8
			12/12/2003	2/19/1999	12/12/2003	2/18/1999	12/10/2003	2/18/1999	12/10/2003	2/19/1999	2/19/1999	12/18/2003	2/19/1999	12/18/2003
CONSTITUENT	UNITS	EPA MCLs	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs														
Dichlorodifluoromethane	(ug/l)													
Vinyl chloride	(ug/l)	2												
Bromomethane	(ug/l)													
Chloroethane	(ug/l)													
1,1-Dichloroethene	(ug/l)	7												
trans-1,2-Dichloroethene	(ug/l)	100												
1,1-Dichloroethane	(ug/l)													
cis-1,2-Dichloroethene	(ug/l)	70												
1,1,1-trichloroethane	(ug/l)	200												
Cyclohexane	(ug/l)													
Trichloroethene	(ug/l)	5												
1,2-Dichloroethane	(ug/l)	5												
Methylcyclohexane	(ug/l)													
4-Methyl-2-pentanone	(ug/l)													
Ethylbenzene	(ug/l)	700												
Xylenes (total)	(ug/l)	10000												
Styrene	(ug/l)	100												
Isopropylbenzene	(ug/l)													
SVOCs														
Phenol	(ug/l)													
2-Methylphenol	(ug/l)													
Acetophenone	(ug/l)													
4-Methylphenol	(ug/l)													
Naphthalene	(ug/l)													
Caprolactam	(ug/l)													
2-Methylnaphthalene	(ug/l)								2J					
2,4,6-Trichlorophenol	(ug/l)													
2,4,5-Trichlorophenol	(ug/l)													
1,1'-Biphenyl	(ug/l)													
Acenaphthylene	(ug/l)													
Acenaphthene	(ug/l)													
Dibenzofuran	(ug/l)													
Diethylphthalate	(ug/l)											4JB		6JB
Fluorene	(ug/l)											0.6J		
Pentachlorophenol	(ug/l)	1			[2]J				[8]J			[21]J		
Phenanthrene	(ug/l)													
Anthracene	(ug/l)													
Carbazole	(ug/l)													
Di-n-butylphthalate	(ug/l)											1JB		0.8JB
Fluoranthene	(ug/l)													
Pyrene	(ug/l)													
Butylbenzylphthalate	(ug/l)													
bis(2-Ethylhexyl) phthalate	(ug/l)	6										3JB		3JB
2,3,5,6-Tetrachlorophenol	(ug/l)													
Phenols (low)														
2,4,6-Trichlorophenol	(ug/l)			11		11		11		11	10		10	
2-Chlorophenol	(ug/l)			11		11		11		11	10		10	
Pentachlorophenol	(ug/l)	1		11		11		11		[11]	[60]	[18]	10	[2.1]
3,4-Dimethylphenol	(ug/l)													
2,3,5,6-Tetrachlorophenol	(ug/l)											1.9		0.054J
2,4-Dinitrophenol	(ug/l)			11		11		11		11	10		10	
PAHs (low)														
Benzo(a)anthracene	(ng/l)											10J		
Benzo(a)pyrene	(ng/l)	200												
Benzo(b)fluoranthene	(ng/l)													7.5J
Benzo(k)fluoranthene	(ng/l)													
Chrysene	(ng/l)											7.4J		

Table 4.2-1
Detected Concentrations in Overburden Ground Water

			RCA-3	RCA-4	RCA-4	RCA-5	RCA-5	RCA-6	RCA-6	RCA-7	RCA-8	RCA-8	RCA-9	RCA-9
			D04412	RCA - 4	D04413	RCA - 5	D04414	RCA - 6	D04415	RCA - 7	RCA - 8	D04417	RCA - 9	D04418
					A18Q3				A18Q5			A18Q7		A18Q8
			12/12/2003	2/19/1999	12/12/2003	2/18/1999	12/10/2003	2/18/1999	12/10/2003	2/19/1999	2/19/1999	12/18/2003	2/19/1999	12/18/2003
CONSTITUENT	UNITS	EPA MCLs	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Dibenz(a,h) anthracene	(ng/l)													
Indeno(1,2,3-cd)pyrene	(ng/l)													
Naphthalene	(ng/l)											33		
Metals														
Aluminum	(ug/l)		440		135		48.2		64.4			44.1		169
Antimony	(ug/l)	6							1.9					
Arsenic	(ug/l)	10	0.31		0.26		2.4		[158]			1.2		0.14B
Barium	(ug/l)	2000	17.1		15.2		19.6		25.3			26.2		26.8
Beryllium	(ug/l)	4												0.11B
Cadmium	(ug/l)	5	0.07B						0.1B					0.13B
Calcium	(ug/l)		6330		10800		4700		10100			24900		5430
Chromium(total)	(ug/l)	100							[241]					
Cobalt	(ug/l)		1.7B											1.1B
Copper	(ug/l)	1300	2.6				1B		3.5					2.3
Iron	(ug/l)		702		193		64.5B		76B			9140		122
Lead	(ug/l)	15	0.8		0.3		0.32		0.13B					0.29
Magnesium	(ug/l)		915		1890		727		1340			2280		926
Manganese	(ug/l)		56.6		17		65.9		71.8			223		68.7
Nickel	(ug/l)													4.4B
Potassium	(ug/l)		1180		1260		1740		2710			3240		1340
Selenium	(ug/l)	50										0.81B		0.78B
Sodium	(ug/l)		6600		17400		39800		35600			16100		10200
Thallium	(ug/l)	2												
Vanadium	(ug/l)													
Zinc	(ug/l)		8.5B		5.8B									51.2
Dioxin														
2,3,7,8-TCDD	(ng/l)	0.00003												
1,2,3,7,8-PeCDD	(ng/l)													
1,2,3,4,7,8-HxCDD	(ng/l)													
1,2,3,6,7,8-HxCDD	(ng/l)													
1,2,3,7,8,9-HxCDD	(ng/l)													
1,2,3,4,6,7,8-HpCDD	(ng/l)													
OCDD	(ng/l)													
1,2,3,7,8-PeCDF	(ng/l)													
2,3,4,7,8-PeCDF	(ng/l)													
1,2,3,4,7,8-HxCDF	(ng/l)													
1,2,3,6,7,8-HxCDF	(ng/l)													
2,3,4,6,7,8-HxCDF	(ng/l)													
1,2,3,7,8,9-HxCDF	(ng/l)													
1,2,3,4,6,7,8-HpCDF	(ng/l)													
1,2,3,4,7,8,9-HpCDF	(ng/l)													
OCDF	(ng/l)													
TCDDs (total)	(ng/l)													
PeCDDs (total)	(ng/l)													
HxCDDs (Total)	(ng/l)													
HpCDDs (total)	(ng/l)													
TCDFs (total)	(ng/l)													
PeCDFs (total)	(ng/l)													
HxCDFs (total)	(ng/l)													
HpCDFs (total)	(ng/l)													
TEQ EMPC (ND=0) 1989	(ng/l)	0.00003												
TEQ EMPC (ND=0) 1998	(ng/l)	0.00003												

Table 4.2-2
Detected Concentrations in Bedrock Ground Water

			BR-1	BR-2	MW-008B	MW-008B	MW-009B	MW-009B	MW-009B	MW-101R	MW-101R	MW-101R	MW-101R	MW-103R	MW-103R	MW-105R	MW-105R
			D04387	D04388	D01865	D04399	D01867	D04400	D04420	D04402	D04787	D05184	D05186	D04403	D05185	D04404	D05187
				A18B8		A18N9		A18P0	A18R0	A18P2		A18R8	A18S0	A18P3	A18R9	A18P4	A18S1
			12/11/2003	12/17/2003	11/14/2001	12/18/2003	11/14/2001	12/17/2003	12/17/2003	12/15/2003	04/16/2004	10/14/2004	10/14/2004	12/18/2003	10/14/2004	12/12/2003	10/14/2004
CONSTITUENT	UNITS	EPA MCLs		Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary		Primary	Duplicate 1	Primary	Primary	Primary	Primary
VOCs																	
Isopropylbenzene	(ug/l)						0.09J										
SVOCs																	
Naphthalene	(ug/l)											2J	3J				
Caprolactam	(ug/l)			4J		14											
2-Methylnaphthalene	(ug/l)			2J								4J	4J				
2,4,6-Trichlorophenol	(ug/l)													4J	4J		
2,4,5-Trichlorophenol	(ug/l)									1J							
1,1'-Biphenyl	(ug/l)									0.6J		2J	2J				
Diethylphthalate	(ug/l)			8JB		8JB		4JB		0.9J				5JB			
Fluorene	(ug/l)												1J				
Pentachlorophenol	(ug/l)	1		[570]	[44]J	[110]	[480]	[860]	[800]	[3000]		[2600]	[2700]	[200]	[180]	[350]	[560]
Phenanthrene	(ug/l)			0.6J													
Di-n-butylphthalate	(ug/l)			1JB	0.28J	1JB	0.27J	0.7JB	0.7J	3JB				1JB			
Pyrene	(ug/l)				0.3J		0.26J										
Butylbenzylphthalate	(ug/l)				1.1J		0.81J										
Benzo(a)anthracene	(ug/l)				0.48J		0.34J										
Chrysene	(ug/l)				0.45J		0.33J										
bis(2-Ethylhexyl) phthalate	(ug/l)	6		4JB		1JB		1JB		2JB				1JB			
Di-n-octylphthalate	(ug/l)				1.2J		0.74J										
Benzo(b)fluoranthene	(ug/l)				0.8J		0.66J										
Benzo(k)fluoranthene	(ug/l)				0.62J		0.26J										
Benzo(a)pyrene	(ug/l)	0.2			[0.31]J												
2,3,5,6-Tetrachlorophenol	(ug/l)				0.25J		6.2J										
Phenols (low)																	
2,4,6-Trichlorophenol	(ug/l)							0.032J		0.1J				5.2E	5.1E	0.034J	
Pentachlorophenol	(ug/l)	1		[660]		[82]		[990]	[580]	[3100]	[2200]	[3000]	[3000]	[210]	[190]	[340]	[650]
2,3,5,6-Tetrachlorophenol	(ug/l)			24E		3.4		37E	23E	110J		450E	460E	10	16E	13J	33E
PAHs (low)																	
Benzo(a)anthracene	(ng/l)		14	9J		15							6.1J	10J		10J	
Benzo(a)pyrene	(ng/l)	200											7J		16	11	
Benzo(b)fluoranthene	(ng/l)					11							6.6J	8.3J	10J	12	
Benzo(k)fluoranthene	(ng/l)												8.4J			9J	
Chrysene	(ng/l)		8.2J	7.6J		12							6.5J	9.2J	7.6J	23	
Dibenz(a,h) anthracene	(ng/l)												15				
Indeno(1,2,3-cd)pyrene	(ng/l)												13				
Naphthalene	(ng/l)			300					16	790		2100	2100	10J	120		130
Metals																	
Aluminum	(ug/l)		120		66.6	26.3	105	16.6		5600	283	709	546	724	79.8	795	51.2
Antimony	(ug/l)	6								0.83	0.5	0.28B	0.3B	0.26B		0.43B	
Arsenic	(ug/l)	10	0.57	2	7.1	[10.6]	6.1	9.2	9.1	[37]	[20.1]	[23.5]	[23.8]	3.6	1.6	8.8	1.6
Barium	(ug/l)	2000	16.5	43.2	41	43.9	40.9	40.2	40.1	45.2	24.5	24.5	23.9	25	13.3	10.6	25.8
Beryllium	(ug/l)	4					0.11J			0.51							
Cadmium	(ug/l)	5			0.05J					0.14B	0.06B						
Calcium	(ug/l)		8080	48100	33300	32000	39900	38700	38700	35500	41800	39700	39500	42400	45300	32500	31100
Chromium(total)	(ug/l)	100								3.2B						4.5B	
Cobalt	(ug/l)				5.1	5.2	2	3	3.2	17.4	15.5	12.7	12.1	1.5B		9	13.1
Copper	(ug/l)	1300	1.2B				1.1J			4.8	1.9B			3.9	4.2	2.1	
Iron	(ug/l)		259	3310	1090	1560	489	433	427	2550	310	710	652	1550	1020	68.8B	137
Lead	(ug/l)	15	0.13B		0.41	0.12B	0.63	0.13B	0.11B	7.5	0.33	0.9	0.81	1.2	0.22	0.15B	
Magnesium	(ug/l)		1230	4080	3820	3710	3940	3870	3850	3210	3740	3830	3790	4430	4390	1010	2380
Manganese	(ug/l)		52.3	406	682	757	622	680	679	1100	2600	2870	2860	1070	1440	120	1690
Mercury	(ug/l)	2								0.1							
Nickel	(ug/l)																
Potassium	(ug/l)		1880	1120	1370	1370	925	875	830	7330	4130	3110	3120	4410	1640	5730	1380
Selenium	(ug/l)	50								2B			0.76B				
Silver	(ug/l)																
Sodium	(ug/l)		40500	6460	15700	16200	10400	10500	10500	44400	33200	27600	27700	25900	24100	8570	7140
Thallium	(ug/l)	2															
Vanadium	(ug/l)									10.3						13.6	
Zinc	(ug/l)		7B		5.2J					15.8B							

Table 4.2-2
Detected Concentrations in Bedrock Ground Water

			MW-107R	MW-109R	MW-111R	PW-001	PW-001
			D05188	D05189	D05190	D04788	D04789
					A18S4		
			10/13/2004	10/15/2004	10/14/2004	04/15/2004	04/15/2004
CONSTITUENT	UNITS	EPA MCLs			Primary		
VOCs							
Isopropylbenzene	(ug/l)						
SVOCs							
Naphthalene	(ug/l)						
Caprolactam	(ug/l)						
2-Methylnaphthalene	(ug/l)						
2,4,6-Trichlorophenol	(ug/l)						
2,4,5-Trichlorophenol	(ug/l)						
1,1'-Biphenyl	(ug/l)						
Diethylphthalate	(ug/l)						
Fluorene	(ug/l)						
Pentachlorophenol	(ug/l)	1			[6]J		
Phenanthrene	(ug/l)						
Di-n-butylphthalate	(ug/l)						
Pyrene	(ug/l)						
Butylbenzylphthalate	(ug/l)						
Benzo(a)anthracene	(ug/l)						
Chrysene	(ug/l)						
bis(2-Ethylhexyl) phthalate	(ug/l)	6					
Di-n-octylphthalate	(ug/l)						
Benzo(b)fluoranthene	(ug/l)						
Benzo(k)fluoranthene	(ug/l)						
Benzo(a)pyrene	(ug/l)	0.2					
2,3,5,6-Tetrachlorophenol	(ug/l)						
Phenols (low)							
2,4,6-Trichlorophenol	(ug/l)						
Pentachlorophenol	(ug/l)	1			[4]	[110]	[120]D
2,3,5,6-Tetrachlorophenol	(ug/l)				0.4		
PAHs (low)							
Benzo(a)anthracene	(ng/l)						
Benzo(a)pyrene	(ng/l)	200					
Benzo(b)fluoranthene	(ng/l)						
Benzo(k)fluoranthene	(ng/l)						
Chrysene	(ng/l)						
Dibenz(a,h) anthracene	(ng/l)						
Indeno(1,2,3-cd)pyrene	(ng/l)						
Naphthalene	(ng/l)		7.1J		8J		
Metals							
Aluminum	(ug/l)		164	175	229	63.9	60
Antimony	(ug/l)	6				5.4	0.5B
Arsenic	(ug/l)	10	4.2	2.5	3.6	5.7	2.7
Barium	(ug/l)	2000	5.7	10.1	22.8	17.8	13.2
Beryllium	(ug/l)	4				1.8	
Cadmium	(ug/l)	5				2	0.06B
Calcium	(ug/l)		30900	18700	31800	44600	44100
Chromium(total)	(ug/l)	100					
Cobalt	(ug/l)					2.2	
Copper	(ug/l)	1300					
Iron	(ug/l)		78.8B	145	96.9B	181	151
Lead	(ug/l)	15		0.12B		2.5	0.54
Magnesium	(ug/l)		1520	2620	1210	5290	5230
Manganese	(ug/l)		49	184	16.6	68.8	66.2
Mercury	(ug/l)	2					
Nickel	(ug/l)					2.8B	
Potassium	(ug/l)		2380	3190	3060	1460	1440
Selenium	(ug/l)	50	0.92B	2.1B		30.8	0.9B
Silver	(ug/l)					8.3N	
Sodium	(ug/l)		7740	6690	13300	21400	21000
Thallium	(ug/l)	2				[4.6]	
Vanadium	(ug/l)				2.6B	3B	
Zinc	(ug/l)						

Table 4.3-1
Detected Concentrations in Sediment

			FPE	FPFP	FPS	FPW	HA-001	HA-003	HA-004	HA-004	RRFP	RRHP01	RRHP02	RRHP03-S	RRHPSB	RRKP-S
							HA-1A	HA-3B	HA-4A	HA-4B						
		Sediment	10/16/1998	10/16/1998	10/16/1998	10/16/1998	3/23/1999	3/23/1999	3/23/1999	3/23/1999	10/16/1998	10/16/1998	10/16/1998	10/16/1998	10/16/1998	10/16/1998
		Screening	0-0.25	0-0.25	0-0.25	0-0.25	0.5-1	1.5-2	0.5-1	1.5-2	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25
CONSTITUENT	UNITS	Criteria	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																
Dichlorodifluoromethane	(ug/kg)															
Vinyl chloride	(ug/kg)	1722.7														
Fluorotrichloromethane	(ug/kg)															
1,1-Dichloroethene	(ug/kg)	31														
Freon 113	(ug/kg)															
Acetone	(ug/kg)	8.7														
Carbon disulfide	(ug/kg)	0.85														
Methyl Acetate	(ug/kg)															
Methylene chloride	(ug/kg)	370														
trans-1,2-Dichloroethene	(ug/kg)	400														
1,1-Dichloroethane	(ug/kg)	27														
cis-1,2-Dichloroethene	(ug/kg)	400														
2-Butanone (MEK)	(ug/kg)	270														
1,1,1-trichloroethane	(ug/kg)	30														
Cyclohexane	(ug/kg)															
Trichloroethene	(ug/kg)	220														
Benzene	(ug/kg)	160														
Methylcyclohexane	(ug/kg)															
Bromodichloromethane	(ug/kg)															
Toluene	(ug/kg)	50														
Tetrachloroethene	(ug/kg)	410														
Chlorobenzene	(ug/kg)	410														
Ethylbenzene	(ug/kg)	89														
Xylenes (total)	(ug/kg)	25												2		
Styrene	(ug/kg)															
Isopropylbenzene	(ug/kg)															
1,3-Dichlorobenzene	(ug/kg)	1700														
1,4-Dichlorobenzene	(ug/kg)	340														
1,2-Dichlorobenzene	(ug/kg)	330														
1,2,4-Trichlorobenzene	(ug/kg)	9600														
SVOCs																
Benzaldehyde	(ug/kg)															
Phenol	(ug/kg)	420														
2-Methylphenol	(ug/kg)	12														
Acetophenone	(ug/kg)															
4-Methylphenol	(ug/kg)	670														
2,4-Dichlorophenol	(ug/kg)															
Naphthalene	(ug/kg)	240														
2-Methylnaphthalene	(ug/kg)															
2,4,6-Trichlorophenol	(ug/kg)															
2,4,5-Trichlorophenol	(ug/kg)															
Biphenyl	(ug/kg)	1100														
Acenaphthylene	(ug/kg)				390											
Acenaphthene	(ug/kg)															
2,3,5,6-Tetrachlorophenol	(ug/kg)															
Dibenzofuran	(ug/kg)	420														
Diethylphthalate	(ug/kg)	600														
Fluorene	(ug/kg)	540														
Pentachlorophenol	(ug/kg)	360						[1300]	[9500]	[1300]				[51000]		
Phenanthrene	(ug/kg)	41.9			[1100]		[1100]							[710]		
Anthracene	(ug/kg)	220			[280]									[680]		
Carbazole	(ug/kg)				49											
Di-n-butylphthalate	(ug/kg)	11000														
Fluoranthene	(ug/kg)	111			[2600]		[1100]									
Pyrene	(ug/kg)	53			[4300]		[1000]									
Butylbenzylphthalate	(ug/kg)	11000														
Benzo(a)anthracene	(ug/kg)	31.7			[1100]		[760]									

Table 4.3-1
Detected Concentrations in Sediment

			FPE	FPFP	FPS	FPW	HA-001	HA-003	HA-004	HA-004	RRFP	RRHP01	RRHP02	RRHP03-S	RRHPSB	RRKP-S
							HA-1A	HA-3B	HA-4A	HA-4B						
		Sediment	10/16/1998	10/16/1998	10/16/1998	10/16/1998	3/23/1999	3/23/1999	3/23/1999	3/23/1999	10/16/1998	10/16/1998	10/16/1998	10/16/1998	10/16/1998	10/16/1998
		Screening	0-0.25	0-0.25	0-0.25	0-0.25	0.5-1	1.5-2	0.5-1	1.5-2	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25
CONSTITUENT	UNITS	Criteria	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Chrysene	(ug/kg)	57.1			[2200]		[760]									
bis(2-Ethylhexyl) phthalate	(ug/kg)	890000														
Di-n-octylphthalate	(ug/kg)	11600000000														
Benzo(b)fluoranthene	(ug/kg)	37			[930]		[870]									
Benzo(k)fluoranthene	(ug/kg)	37			[1300]											
Benzo(a)pyrene	(ug/kg)	31.9			[1400]		[500]									
Indeno(1,2,3-cd)pyrene	(ug/kg)	30			[870]		[400]									
Dibenz(a,h) anthracene	(ug/kg)	10			[200]											
Benzo(g,h,i)perylene	(ug/kg)	170			[850]		[430]									
Metals																
Aluminum	(mg/kg)	14000			3570						3020	3930	3750	3220		2480
Antimony	(mg/kg)	64														
Arsenic	(mg/kg)	5.9										[9.20]		[17]		0.7
Barium	(mg/kg)	20			12.7						15.9	[22.30]	[21.20]	16.5		17.4
Beryllium	(mg/kg)				0.63						0.71	0.77	0.64	0.7		0.79
Cadmium	(mg/kg)	0.6			0.45						0.48	[0.63]	0.54	0.44		[0.74]
Calcium	(mg/kg)				0.45						0.48	949	1600	1560		928
Chromium(total)	(mg/kg)	37.3			8						4.1	20.7	8.1	8.4		5.7
Cobalt	(mg/kg)				2.7						2.5	3	3.5	3.2		2
Copper	(mg/kg)	35.7			4.4						6.2	27.4	15.3	8.9		8.2
Iron	(mg/kg)				7270						8480	9700	6890	8100		7680
Lead	(mg/kg)	35			11.4						14.5	23.4	[37.30]	13.2		27.2
Magnesium	(mg/kg)				1840						1220	1830	1350	1500		1010
Manganese	(mg/kg)	460			150						161	153	128	201		186
Mercury	(mg/kg)	0.17														
Nickel	(mg/kg)	18			8.3						3.6	9.1	5.9	8.1		3.8
Potassium	(mg/kg)				141						156	210	164	157		139
Selenium	(mg/kg)	0.1														
Silver	(mg/kg)	4.5										0.32		0.97		0.22
Sodium	(mg/kg)				39.8						49.3	127	114	77.1		52.5
Thallium	(mg/kg)												1.4			
Vanadium	(mg/kg)				8.8						8.8	9.3	11	7.8		9.9
Zinc	(mg/kg)	123			35.7						35.4	54.3	43.5	59.6		40.3
Pesticides/PCBs																
4,4'-DDD	(ug/kg)	3.54														
4,4'-DDE	(ug/kg)	1.42														
4,4'-DDT	(ug/kg)	6.98														
Aldrin	(ug/kg)	2														
alpha-Chlordane	(ug/kg)	4.5														
Dieldrin	(ug/kg)	2.85														
Endosulfan II	(ug/kg)	5.5														
Endosulfan sulfate	(ug/kg)													13		
Endrin	(ug/kg)	2.67														
gamma-Chlordane	(ug/kg)	4.5														
Methoxychlor	(ug/kg)	19														
Aroclor 1254	(ug/kg)	34.1														
Aroclor 1260	(ug/kg)	34.1														
Dioxin																
2,3,7,8-TCDD	(ng/kg)	410											20.6J	1.89J		
1,2,3,7,8-PeCDD	(ng/kg)											15.9J	41J	45.5J		
1,2,3,4,7,8-HxCDD	(ng/kg)											72.9J	188J	239J		
1,2,3,6,7,8-HxCDD	(ng/kg)											269J	4460J	2410J	16.4J	
1,2,3,7,8,9-HxCDD	(ng/kg)											131J	562J	577J		
1,2,3,4,6,7,8-HpCDD	(ng/kg)		92.6J	122J	57.6J	85J					14.6J	4240J	126000J	47100J	571J	57.5J
OCDD	(ng/kg)		537J	632J	163J	253J						26800J	912000J	307000J	3800J	150J
2,3,7,8-TCDF	(ng/kg)												2.48*			
1,2,3,7,8-PeCDF	(ng/kg)											4.98J	49.2J	11.1J		
2,3,4,7,8-PeCDF	(ng/kg)											3.87J	76.5J	14.7J		

Table 4.3-1
Detected Concentrations in Sediment

			FPE	FPFP	FPS	FPW	HA-001	HA-003	HA-004	HA-004	RRFP	RRHP01	RRHP02	RRHP03-S	RRHPSB	RRKP-S
							HA-1A	HA-3B	HA-4A	HA-4B						
		Sediment	10/16/1998	10/16/1998	10/16/1998	10/16/1998	3/23/1999	3/23/1999	3/23/1999	3/23/1999	10/16/1998	10/16/1998	10/16/1998	10/16/1998	10/16/1998	10/16/1998
		Screening	0-0.25	0-0.25	0-0.25	0-0.25	0.5-1	1.5-2	0.5-1	1.5-2	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25
CONSTITUENT	UNITS	Criteria	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
1,2,3,4,7,8-HxCDF	(ng/kg)											47.9J	582J	271J		
1,2,3,6,7,8-HxCDF	(ng/kg)											34.9J	196J	102J	8.69J	
2,3,4,6,7,8-HxCDF	(ng/kg)											68J	102J	200J		
1,2,3,7,8,9-HxCDF	(ng/kg)												12.2J			
1,2,3,4,6,7,8-HpCDF	(ng/kg)		13.9J	33.1J	19.6J	27.4J						721J	18500J	6850J	78.1J	21.9J
1,2,3,4,7,8,9-HpCDF	(ng/kg)											122J	1400J	809J		
OCDF	(ng/kg)			112J	58.1J	59.2J						2070J	101000J	33400J	294J	50.7J
TCDDs (total)	(ng/kg)															
PeCDDs (total)	(ng/kg)											43.7J	241J	131J		
HxCDDs (Total)	(ng/kg)															
HpCDDs (total)	(ng/kg)			244J								6400J	127000J	65700J	878	
TCDFs (total)	(ng/kg)															
PeCDFs (total)	(ng/kg)		13.4	15.2J	11.8							216J	1070J	307J	38.9	20
HxCDFs (total)	(ng/kg)											1490J	12000J	10100J	233	
HpCDFs (total)	(ng/kg)											4740J	26300J	14600J	371	
TEQ EMPC (ND=0) 1989	(ng/kg)	410	1.6J	2.3J	0.993J	1.44J					0.146J	152J	[3164]J	[1300]J	13.1J	0.995J
TEQ EMPC (ND=0) 1998	(ng/kg)	410	1.1187J	1.6254J	0.7941J	1.15522J					0.146J	134.171J	[2273.078]J	[1016.825]J	9.4094J	0.8141J

Table 4.3-1
Detected Concentrations in Sediment

			RRUS-S	RRUS-S	SD-001	SD-001	SD-002	SD-003	SD-003	SD-004	SD-004	SD-005	SD-005	SD-006	SD-006	SD-007	SD-007
				RRUS-2S	D01917	D01918	D01919	D01921	D01922	D01923	D01924	D01926	D01990	D01927	D01928	D01929	D01930
		Sediment	10/16/1998	10/16/1998	11/5/2001	11/5/2001	11/5/2001	11/8/2001	11/8/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/7/2001	11/7/2001	11/7/2001	11/7/2001
		Screening	0-0.25	0-0.25	0-0.5	0.5-1	0-0.25	0-0.5	0.5-1.83	0-0.5	0.5-1.08	0.5-1.17	0-0.5	0-0.5	0.5-1	0-0.5	0.5-1.5
CONSTITUENT	UNITS	Criteria	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs																	
Dichlorodifluoromethane	(ug/kg)																
Vinyl chloride	(ug/kg)	1722.7															
Fluorotrichloromethane	(ug/kg)														3.8J		
1,1-Dichloroethene	(ug/kg)	31															
Freon 113	(ug/kg)																
Acetone	(ug/kg)	8.7			[85]JEB	[160]JEB										[250]JEB	[81]JEB
Carbon disulfide	(ug/kg)	0.85												[16]EB	[17]EB	[21]JEB	[15]JEB
Methyl Acetate	(ug/kg)				420J	120J	74J	1100	99J	45J			200	90	130	740J	130J
Methylene chloride	(ug/kg)	370										28J					
trans-1,2-Dichloroethene	(ug/kg)	400															
1,1-Dichloroethane	(ug/kg)	27															
cis-1,2-Dichloroethene	(ug/kg)	400															
2-Butanone (MEK)	(ug/kg)	270												20JEB	44JEB	150JEB	180JEB
1,1,1-trichloroethane	(ug/kg)	30															
Cyclohexane	(ug/kg)							8J									
Trichloroethene	(ug/kg)	220															
Benzene	(ug/kg)	160										32J					
Methylcyclohexane	(ug/kg)							16									
Bromodichloromethane	(ug/kg)																
Toluene	(ug/kg)	50	38	8				[50]			22J	38J		3.8JEB	3.7EB	8.1JEB	3JEB
Tetrachloroethene	(ug/kg)	410															
Chlorobenzene	(ug/kg)	410															
Ethylbenzene	(ug/kg)	89															
Xylenes (total)	(ug/kg)	25						[94]									
Styrene	(ug/kg)																
Isopropylbenzene	(ug/kg)							33									
1,3-Dichlorobenzene	(ug/kg)	1700															
1,4-Dichlorobenzene	(ug/kg)	340															
1,2-Dichlorobenzene	(ug/kg)	330															
1,2,4-Trichlorobenzene	(ug/kg)	9600															
SVOCs																	
Benzaldehyde	(ug/kg)				13J		10J		16J			11J	27J	30J	15J	54J	18J
Phenol	(ug/kg)	420															
2-Methylphenol	(ug/kg)	12															
Acetophenone	(ug/kg)																
4-Methylphenol	(ug/kg)	670		360												83J	
2,4-Dichlorophenol	(ug/kg)																
Naphthalene	(ug/kg)	240		49	15J	22J	10J	[940]J	14J			9J	13J			9J	
2-Methylnaphthalene	(ug/kg)			69	13J	10J	12J	470J									
2,4,6-Trichlorophenol	(ug/kg)																
2,4,5-Trichlorophenol	(ug/kg)							450J	100J								
Biphenyl	(ug/kg)	1100						260J	11J								
Acenaphthylene	(ug/kg)		800	570	14J	32	10J					24J	38J				
Acenaphthene	(ug/kg)		270	200	22J	27J	24J						9J				
2,3,5,6-Tetrachlorophenol	(ug/kg)							300J	48J								32J
Dibenzofuran	(ug/kg)	420	130	150	20J	29J	13J						9J				
Diethylphthalate	(ug/kg)	600															
Fluorene	(ug/kg)	540	[890]	430	36	49	33					14J	23J				
Pentachlorophenol	(ug/kg)	360						[2300]J	[2000]J					14J	18J		25J
Phenanthrene	(ug/kg)	41.9	[7000]	[2600]	[480]	[510]	[400]	[740]J	15J	18J	4.1J	[180]	[260]	4.1J		36J	11J
Anthracene	(ug/kg)	220	[1500]	[420]	56	76	33					21J	28J				
Carbazole	(ug/kg)		140	140	52J	46J	42J					11J	21J				
Di-n-butylphthalate	(ug/kg)	11000															
Fluoranthene	(ug/kg)	111	[4900]	[2400]	[820]	[770]	[810]	[1200]J	9J	40JEB	7.8JEB	[340]	[480]	4.9JEB	2.8JEB	51J	11J
Pyrene	(ug/kg)	53	[11000]	[6600]	[610]	[690]	[720]	[1900]JEB	19J	46J	8.9J	[320]	[590]	6.9J	3.3J	44J	13J
Butylbenzylphthalate	(ug/kg)	11000															
Benzo(a)anthracene	(ug/kg)	31.7	[2700]	[1400]	[370]	[380]	[380]	[610]JEB	4.8J	22J	3J	[140]	[260]	2.6J	1.4J	21J	4.4J

Table 4.3-1
Detected Concentrations in Sediment

			RRUS-S	RRUS-S	SD-001	SD-001	SD-002	SD-003	SD-003	SD-004	SD-004	SD-005	SD-005	SD-006	SD-006	SD-007	SD-007
				RRUS-2S	D01917	D01918	D01919	D01921	D01922	D01923	D01924	D01926	D01990	D01927	D01928	D01929	D01930
		Sediment	10/16/1998	10/16/1998	11/5/2001	11/5/2001	11/5/2001	11/8/2001	11/8/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/7/2001	11/7/2001	11/7/2001	11/7/2001
		Screening	0-0.25	0-0.25	0-0.5	0.5-1	0-0.25	0-0.5	0.5-1.83	0-0.5	0.5-1.08	0.5-1.17	0-0.5	0-0.5	0.5-1	0-0.5	0.5-1.5
CONSTITUENT	UNITS	Criteria	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Chrysene	(ug/kg)	57.1	[6000]	[4000]	[260]	[330]	[340]	[860]J	8.2J	24J	5J	[160]	[280]	3.8J	2.6J	32J	6.9J
bis(2-Ethylhexyl) phthalate	(ug/kg)	890000					440J										
Di-n-octylphthalate	(ug/kg)	11600000000							18J						9J		
Benzo(b)fluoranthene	(ug/kg)	37	[1300]	[1600]	[450]	[500]	[380]	[830]J		27J	5J	[190]	[380]	3.1J	2.1J	30J	7.4J
Benzo(k)fluoranthene	(ug/kg)	37	[2200]	[1700]	[270]	[280]	[240]	[610]J		17J	4.3J	[140]	[230]	2.7J	1.5J	26J	4.5J
Benzo(a)pyrene	(ug/kg)	31.9	[2400]	[1600]	[270]	[340]	[240]	[330]J		25J	2.8J	[150]	[240]	1.9J	1.1J	27J	4J
Indeno(1,2,3-cd)pyrene	(ug/kg)	30	[1200]	[1200]	[180]	[170]	[140]			12J		[66]	[130]			9J	
Dibenz(a,h) anthracene	(ug/kg)	10			[50]	[37]	[38]			2.5J	0.66J		[37]	0.41J	0.31J	1.8J	0.38J
Benzo(g,h,i)perylene	(ug/kg)	170	[1100]		120	130	120			9J		50	110				
Metals																	
Aluminum	(mg/kg)	14000	3880	4060	2940	3360	1600	3650	4110	3940	4420	3090	2400	2020	3200	3670	4420
Antimony	(mg/kg)	64			0.15J	0.12J	0.13J	2J								0.15J	
Arsenic	(mg/kg)	5.9	5.5	5.4	3.1	2.1	1	2.1	1.2	0.95	0.64	0.55	0.77	0.21	0.18J	1.3	1
Barium	(mg/kg)	20	5.5	[77.8]	[22.9]	[27.4]	19.5	[53]	17.4	18.5	18.2	14.4	13.8	11.2	12.3	[22.6]	19.3
Beryllium	(mg/kg)		0.26	0.28	0.41	0.28	0.15	0.49	0.26	0.29	0.24	0.23	0.29	0.19	0.17	0.35	0.28
Cadmium	(mg/kg)	0.6	[1.8]	[1.7]	0.22	0.15	0.12	[0.67]J	0.11	0.12	0.08	0.24	0.17	0.1	0.07	0.54	0.16
Calcium	(mg/kg)		1.8	1.7	874EB	1150EB	797EB	1840	1320EB	1380EB	1510EB	849EB	803EB	925EB	1470EB	1450EB	1590EB
Chromium(total)	(mg/kg)	37.3	16.4	12.8	6.1	11.2	5.6	[49]	11.4	10.2	10.2	7.8	5.7	3.1	11.5	11.4	12.7
Cobalt	(mg/kg)		3.8	3.5	2.3	3.2	2.4	2.1	3.8	4.2	3.5	2.2	2	1.9	2.9	2.9	3.8
Copper	(mg/kg)	35.7	30.3	30.8	9.6	16.1	12.5	[44.9]	7.7	8.2	8.7	11.4	9.5	2.1	4.5	13.2	9.2
Iron	(mg/kg)		10200	10800	12600	14400	9500	3790	6780	6140	6670	7960	4900	2740	4950	5590	6780
Lead	(mg/kg)	35	[10200]	[142]	[106]	[85.8]	[171]	[66.1]	6.5	6	5.8	26.9	34.1	5.9	5.2	16.6	7
Magnesium	(mg/kg)		1860	2130	891	1300	726	820	2010	1730	1850	1090	873	921	1650	1290	1910
Manganese	(mg/kg)	460	229	279	225	332	274	71.8	103	99.6	94.8	129	146	52.6	73.3	103	98.3
Mercury	(mg/kg)	0.17	[1.6]	[0.35]	0.01J	0.01J		0.02J				0.03	0.03			0.04	0.01J
Nickel	(mg/kg)	18	12.4	10.4	5	9.7	4.8	4.7J	6.4	7.4	6.5	3.8	3.1	3.7	5.6	7	7.2
Potassium	(mg/kg)		256	259	160	251	220	123	369	422	459	204	119	125	181	211	422
Selenium	(mg/kg)	0.1						[0.68]J									
Silver	(mg/kg)	4.5			0.12	0.11	0.05	0.06J	0.05	0.06	0.05	0.23	0.29	0.04	0.03J	0.48	0.13
Sodium	(mg/kg)		247	306	61.2	55.7	40.6J	91.3	44.3J	59.4	60.9	63	71.7	83.8	69.9	66.6	68.4
Thallium	(mg/kg)						0.02J					0.02J	0.02J	0.02J	0.02J		
Vanadium	(mg/kg)		22.2	23.2	12.7	13.9	4.5	14.1	19.1	18.2	19.6	8.9	7.4	6.1	13.1	15.2	20.5
Zinc	(mg/kg)	123	22.2	23.2	62.2J	69.9J	37J	37.6	32.6J	25.7J	27.6J	36.4J	26.5J	15.6J	19.7J	36J	30.8J
Pesticides/PCBs																	
4,4'-DDD	(ug/kg)	3.54	[180]	[180]				[8.03]J					1.47J				
4,4'-DDE	(ug/kg)	1.42	[51]	[51]				[9.1]J				1.27	[1.46]	0.729J		[2.25]J	
4,4'-DDT	(ug/kg)	6.98	[14]	[7.8]		2.52J	2.12					2.39J	3.41J			0.877J	
Aldrin	(ug/kg)	2						[3.25]J									
alpha-Chlordane	(ug/kg)	4.5				0.421J		2.21J					0.361				
Dieldrin	(ug/kg)	2.85														1.16J	
Endosulfan II	(ug/kg)	5.5					0.813J										
Endosulfan sulfate	(ug/kg)																
Endrin	(ug/kg)	2.67															
gamma-Chlordane	(ug/kg)	4.5						[5.69]J									
Methoxychlor	(ug/kg)	19				8.64J						3.4J	4.84J				
Aroclor 1254	(ug/kg)	34.1				13.1J		[34.5]J								12.1	
Aroclor 1260	(ug/kg)	34.1						18J				6.86J	13				
Dioxin																	
2,3,7,8-TCDD	(ng/kg)	410	1.42*														
1,2,3,7,8-PeCDD	(ng/kg)		4.3*	2.45*				4.84J									
1,2,3,4,7,8-HxCDD	(ng/kg)		39.6J					20.4J								12.1	
1,2,3,6,7,8-HxCDD	(ng/kg)		85.7J	13.5*				59.4J								67.2	11.1
1,2,3,7,8,9-HxCDD	(ng/kg)		49.2J					46.7J								28.1	
1,2,3,4,6,7,8-HpCDD	(ng/kg)		690J	350J	95.8	76.6	58.1	1110J	27.3	17.5		14.4	20.2	260		1630	427
OCDD	(ng/kg)		3160J	1500J	540	560	409	7930J	162	122		89.5	128	1400		13600	3140
2,3,7,8-TCDF	(ng/kg)		6.23J	4.57*				3.35J									
1,2,3,7,8-PeCDF	(ng/kg)		2.35*	2.29*				3.84J									
2,3,4,7,8-PeCDF	(ng/kg)		3.92*	2.34*				4.59J									

Table 4.3-1

Detected Concentrations in Sediment

			RRUS-S	RRUS-S	SD-001	SD-001	SD-002	SD-003	SD-003	SD-004	SD-004	SD-005	SD-005	SD-006	SD-006	SD-007	SD-007
				RRUS-2S	D01917	D01918	D01919	D01921	D01922	D01923	D01924	D01926	D01990	D01927	D01928	D01929	D01930
		Sediment	10/16/1998	10/16/1998	11/5/2001	11/5/2001	11/5/2001	11/8/2001	11/8/2001	11/6/2001	11/6/2001	11/6/2001	11/6/2001	11/7/2001	11/7/2001	11/7/2001	11/7/2001
		Screening	0-0.25	0-0.25	0-0.5	0.5-1	0-0.25	0-0.5	0.5-1.83	0-0.5	0.5-1.08	0.5-1.17	0-0.5	0-0.5	0.5-1	0-0.5	0.5-1.5
CONSTITUENT	UNITS	Criteria	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
1,2,3,4,7,8-HxCDF	(ng/kg)		17.9J	9.27J				30.4J								11.8	
1,2,3,6,7,8-HxCDF	(ng/kg)		8.02J	5.41*				23.1J								25.8	
2,3,4,6,7,8-HxCDF	(ng/kg)		6.9*	3.73*													
1,2,3,7,8,9-HxCDF	(ng/kg)																
1,2,3,4,6,7,8-HpCDF	(ng/kg)		332J	76.1J	18.6	16.4	11.5	259J						36.1		330	57.6
1,2,3,4,7,8,9-HpCDF	(ng/kg)		28.1J	8.73J				30.8J								30.1	
OCDF	(ng/kg)		1650J	272J	57.3	56		631J						217		1680	333
TCDDs (total)	(ng/kg)									0.635J	0.989J					1.89J	
PeCDDs (total)	(ng/kg)		36.3		1.24J		0.759J				3.29J	0.363J		0.311J		3.21J	0.948J
HxCDDs (Total)	(ng/kg)				8.05JEB	3.69JEB	3.79JEB	315J	4.39JEB	3.31JEB	2.05JEB	0.526JEB	7.99JEB	24.9JEB		258JEB	47.9JEB
HpCDDs (total)	(ng/kg)		588	588	146J	124J	96.5J	1800J	43.5J	29.2J	9.83J	14.4J	34.7J	375J		2880J	665J
TCDFs (total)	(ng/kg)								2.05J		0.614J	0.878J	16.5J	3.65J	1.03J	50.8J	3.02J
PeCDFs (total)	(ng/kg)		91.5	52.8	5.88JEB	4.64JEB	4.48JEB	70.1J	2.57JEB			4.89JEB	11.6JEB	2.14JEB	0.625JEB	101JEB	19.1JEB
HxCDFs (total)	(ng/kg)		315		24.2J	23.2J		436J	12.1J	4J		6.37J	14.3J	33J		593J	129J
HpCDFs (total)	(ng/kg)		315	264	68.5J	58.3J	44J	962J	23.2J	12.4J	1.08J	11.9J	18.3J	208J	0.279J	1740J	315J
TEQ EMPC (ND=0) 1989	(ng/kg)	410	42.3J	12.3J	1.7	1.5	1.1	46J	0.44	0.3		0.23	0.33	4.6		50	9.4
TEQ EMPC (ND=0) 1998	(ng/kg)	410	40.1445J	11.908J	1.2	0.99	0.74	40J	0.29	0.19	0.0U	0.15	0.21	3.1		36	6.3

Table 4.3-1
Detected Concentrations in Sediment

CONSTITUENT	UNITS	Sediment Screening Criteria	SD-008 D01931 11/8/2001 0-0.5 Primary	SD-008 D01932 11/8/2001 0.5-2 Primary	SD-009 D01933 11/8/2001 0-0.5 Primary	SD-009 D01991 11/8/2001 0-0.5 Duplicate 1	SD-009 D01934 11/8/2001 0.5-1.83 Primary	SD-010 D01935 11/8/2001 0-0.5 Primary	SD-011 D01937 11/9/2001 0-0.5 Primary	SD-012 D01939 11/9/2001 0-0.5 Primary	SD-013 D01941 11/9/2001 0-0.5 Primary	SD-013 D01942 11/9/2001 0.5-2 Primary	SD-013 D01992 11/9/2001 0.5-2 Duplicate 1	SD-014 D01943 11/9/2001 0-0.5 Primary	SD-014 D01944 11/9/2001 0.5-2 Primary	SD-015 D01945 11/7/2001 0-0.5 Primary	SD-015 D01946 11/7/2001 0.5-1.67 Primary
VOCs																	
Dichlorodifluoromethane	(ug/kg)																12EB
Vinyl chloride	(ug/kg)	1722.7															
Fluorotrichloromethane	(ug/kg)									3J							11
1,1-Dichloroethene	(ug/kg)	31															
Freon 113	(ug/kg)																4.8J
Acetone	(ug/kg)	8.7		[160]JEB	[240]JEB											[170]EB	
Carbon disulfide	(ug/kg)	0.85														[27]JEB	
Methyl Acetate	(ug/kg)		1900J	250J	340				3400J		2500J	620J	580J	650		430	59J
Methylene chloride	(ug/kg)	370															
trans-1,2-Dichloroethene	(ug/kg)	400															
1,1-Dichloroethane	(ug/kg)	27				3.4J	3.1J										
cis-1,2-Dichloroethene	(ug/kg)	400				5.3J			5.8			6.8J	4.4J				
2-Butanone (MEK)	(ug/kg)	270														74JEB	200JEB
1,1,1-trichloroethane	(ug/kg)	30					3J										
Cyclohexane	(ug/kg)						3.1J		3.8J								4.2J
Trichloroethene	(ug/kg)	220			46J	14J	7.7		14							18J	
Benzene	(ug/kg)	160															
Methylcyclohexane	(ug/kg)					5.3J	10	5.2J	5.5								5.8
Bromodichloromethane	(ug/kg)																
Toluene	(ug/kg)	50			[90]J						[86]J	[100]J	42J			21JEB	20EB
Tetrachloroethene	(ug/kg)	410															
Chlorobenzene	(ug/kg)	410				3.2J											
Ethylbenzene	(ug/kg)	89			86J												
Xylenes (total)	(ug/kg)	25			[370]J	[62]J	[48]	6.2	11	2.8J	18J	16J	10J	4.1J	4.5J	13J	7.4
Styrene	(ug/kg)					3.4J											
Isopropylbenzene	(ug/kg)					6.3	4.1J										
1,3-Dichlorobenzene	(ug/kg)	1700															
1,4-Dichlorobenzene	(ug/kg)	340															
1,2-Dichlorobenzene	(ug/kg)	330							3J								
1,2,4-Trichlorobenzene	(ug/kg)	9600															
SVOCs																	
Benzaldehyde	(ug/kg)			44J				22J		70J		46J	46J			17J	
Phenol	(ug/kg)	420															
2-Methylphenol	(ug/kg)	12															
Acetophenone	(ug/kg)															9J	
4-Methylphenol	(ug/kg)	670															
2,4-Dichlorophenol	(ug/kg)																
Naphthalene	(ug/kg)	240	[910]J	11J	[410]J	[260]J	130J	28J		14J		74J	83J	[320]J	[710]J	11J	
2-Methylnaphthalene	(ug/kg)		420J		480J	280J	210J	28J		13J		91J	94J	360J	690J		280J
2,4,6-Trichlorophenol	(ug/kg)																
2,4,5-Trichlorophenol	(ug/kg)						240J										
Biphenyl	(ug/kg)	1100			320J		56J	9J				17J	16J				
Acenaphthylene	(ug/kg)						11J					170J	160J	600J	1100J		
Acenaphthene	(ug/kg)						44J					70J	65J				
2,3,5,6-Tetrachlorophenol	(ug/kg)				490J		320J										
Dibenzofuran	(ug/kg)	420					77J	14J				94J	72J	220J	280J		
Diethylphthalate	(ug/kg)	600								21J							
Fluorene	(ug/kg)	540			[600]J	390J	94J					230J	200J	[1300]J	[1600]J		
Pentachlorophenol	(ug/kg)	360		9J	[27000]J	[21000]J	[16000]J	28J								46J	
Phenanthrene	(ug/kg)	41.9	[2500]J	23J	[1600]J	[1000]J	[360]J	[70]J	[490]JEB	[42]J	[1200]J	[1200]J	[1000]J	[12000]J	[15000]J	33J	[78]J
Anthracene	(ug/kg)	220	[470]J				28J	10J		11J		140J	140J	[910]J	[1400]J		
Carbazole	(ug/kg)		260J				32J					80J	69J	520J			
Di-n-butylphthalate	(ug/kg)	11000	260J		290J	260J					250J				290J		380J
Fluoranthene	(ug/kg)	111	[5700]J	12J	[330]JEB	[600]J	[400]J	110J	[1800]JEB	52J	[2000]J	[1700]J	[1600]J	[11000]J	[16000]J	72J	[150]JEB
Pyrene	(ug/kg)	53	[6700]J	10J	[890]J	[520]J	[410]J	[130]J	[1100]JEB	[71]J	[2600]JEB	[1700]J	[1600]J	[19000]J	[30000]J	46J	
Butylbenzylphthalate	(ug/kg)	11000															
Benzo(a)anthracene	(ug/kg)	31.7	[2900]J		[330]J		[140]J	[59]J	[230]JEB	27J	[1000]JEB	[1100]J	[980]J	[5100]J	[9200]J	28J	

Table 4.3-1
Detected Concentrations in Sediment

			SD-008	SD-008	SD-009	SD-009	SD-009	SD-010	SD-011	SD-012	SD-013	SD-013	SD-013	SD-014	SD-014	SD-015	SD-015
			D01931	D01932	D01933	D01991	D01934	D01935	D01937	D01939	D01941	D01942	D01992	D01943	D01944	D01945	D01946
		Sediment	11/8/2001	11/8/2001	11/8/2001	11/8/2001	11/8/2001	11/8/2001	11/9/2001	11/9/2001	11/9/2001	11/9/2001	11/9/2001	11/9/2001	11/9/2001	11/7/2001	11/7/2001
		Screening	0-0.5	0.5-2	0-0.5	0-0.5	0.5-1.83	0-0.5	0-0.5	0-0.5	0-0.5	0.5-2	0.5-2	0-0.5	0.5-2	0-0.5	0.5-1.67
CONSTITUENT	UNITS	Criteria	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary
Chrysene	(ug/kg)	57.1	[2800]JEB	10J	[460]J	[280]J	[170]J	[65]J	[760]JEB	37J	[1100]JEB	[610]J	[650]J	[6000]J	[9800]J	31J	
bis(2-Ethylhexyl) phthalate	(ug/kg)	890000			3500J											220J	3900J
Di-n-octylphthalate	(ug/kg)	11600000000		10J	300J					11J							
Benzo(b)fluoranthene	(ug/kg)	37	[3400]J		[210]J		[170]J	[81]J	[1000]JEB	27JEB	[1400]JEB	[1300]J	[1200]J	[5200]J	[11000]J	[62]J	
Benzo(k)fluoranthene	(ug/kg)	37	[1500]J		[170]J		[120]J	[55]J	[420]JEB	19J	[870]JEB	[450]J	[390]J	[4900]J	[5400]J	[41]J	
Benzo(a)pyrene	(ug/kg)	31.9	[2000]J		[140]J		[88]J	[40]J	[110]JEB	25J	[1100]JEB	[630]J	[680]J	[4600]J	[7500]J	[44]J	
Indeno(1,2,3-cd)pyrene	(ug/kg)	30	[1100]J				[62]J	29J		14J	[480]J	[350]J	[340]J	[2700]J	[5400]J	12J	
Dibenz(a,h) anthracene	(ug/kg)	10	[270]J		[54]J		[20]J		[25]JEB	2.6JEB	[120]JEB	[140]J	[110]J	[770]J	[1600]J		
Benzo(g,h,i)perylene	(ug/kg)	170	[830]J				47J	25J		14J	[330]J	[280]J	[250]J	[2400]J	[4300]J	10J	
Metals																	
Aluminum	(mg/kg)	14000	4910	4430	3520	3990	3050	4780	3430	4250	5680	5830	4660	2750	3340	2360	3410
Antimony	(mg/kg)	64	4.3J		0.73J	0.83J	0.22J	0.43J	0.75J	0.6J	1.3J	0.37J	0.26J	0.08J	0.12J	0.29J	
Arsenic	(mg/kg)	5.9	4	0.95	[20.5]	[14.9]	[19.7]	4.9	[7.8]	3.2	3.4	2.2	1.7	0.57	0.7	1	0.45
Barium	(mg/kg)	20	[57.3]	19.6	[22]	[23.8]	[21.5]	[53.8]	[29.3]	[50.8]	[46.2]	[30.4]	[26.4]	[63.4]	17.3	12.2	12.4
Beryllium	(mg/kg)		0.82	0.29	0.24	0.3	0.22	0.2	0.19	0.19	0.46	0.29	0.27	0.15	0.39	0.17	0.19
Cadmium	(mg/kg)	0.6	[1.5]J	0.12	0.18	0.19J	0.05J	0.1J	0.16J	0.3J	[0.69]J	0.26J	0.19J	0.09J	0.13J	0.28	0.1
Calcium	(mg/kg)		2840	1610EB	934EB	1180	763	1650	2550	2740	5170	1720	1430	1530	1040	998EB	1070EB
Chromium(total)	(mg/kg)	37.3	29.8	13.1	9.7	11.1	5.4	8.3	12.8	12.5	15.5	9.4	8.2	7.5	5.4	6.2	9.1
Cobalt	(mg/kg)		6.2	3.9	3.2	3.7	2.2	5.2	3.4	3.7	5.4	4.1	2.9	2.7	1.9	2.5	2.6
Copper	(mg/kg)	35.7	[73.1]	11.4	16.6	20	8.8	13.3	18.1	13.6	26.8	14.3	11.5	8.2	6.6	7.9	6.4
Iron	(mg/kg)		7670	7420	7840	8680	8870	15800	20400	11200	10800	10400	8240	7370	4490	3210	4000
Lead	(mg/kg)	35	[65.9]	6.8	32.8	[36.2]	15.5	34.4	29.4	16	[38.1]	[35.7]	29.2	[35.7]	23.4	9.6	4.8
Magnesium	(mg/kg)		767	2130	1630	2030	1200	2600	1840	2200	1400	1880	1170	1430	1420	1000	1300
Manganese	(mg/kg)	460	89.2	101	161	157	228	[1300]	420	[822]	379	225	191	[1070]	127	58.8	68.3
Mercury	(mg/kg)	0.17			0.06	0.03		0.01J	0.03	0.02J			0.03	0.02	0.02	0.03	
Nickel	(mg/kg)	18	10.9J	7.7	14.7	17.1J	4.1J	8.9J	12.1J	[19.9]J	10.4J	6.9J	5.2J	4.5J	6.5J	6.1	4.6
Potassium	(mg/kg)		116	420	214	197	257	267	191	221	289	272	180	171	142	160	304
Selenium	(mg/kg)	0.1	[1.8]								[0.77]J						
Silver	(mg/kg)	4.5	0.24J	0.05	2.1	2.3J	0.25J	0.35J	0.81J	1.4J	1.6J	0.35J	0.21J	0.04J	0.17J	1.8	0.25
Sodium	(mg/kg)		175	101	36.8J	41J	35.9J	61.5	52.7	76.9	246	92	77.4	56.9	53.9	39.9J	42.7J
Thallium	(mg/kg)		0.11J		0.03J	0.03J		0.03J	0.03J	0.03J						0.03J	
Vanadium	(mg/kg)		18.8	21	9.3	13.4	6.9	15.1	11.6	12.1	16.3	14.2	11.7	10.4	8.7	9	15.6
Zinc	(mg/kg)	123	88.8	35.3J	39.7J	42.8	25.9	55.5	64.1	55.6	76.4	70	47.8	40	29.9	28.5J	22.2J
Pesticides/PCBs																	
4,4'-DDD	(ug/kg)	3.54	[6.87]J		[7.09]J	[6.94]J				0.8J	[49.4]	[14.1]J	[21.3]J	[112]J		1.62J	
4,4'-DDE	(ug/kg)	1.42	[9.27]J							[2.32]	[17.4]J	[5.35]J	[7.6]J	[17.9]J	[8.38]J	1.18J	
4,4'-DDT	(ug/kg)	6.98	3.67J					1.46J	3.15J	0.976	[7.57]	4.16J	[7.2]J	[19.8]J	[13.7]J	0.692J	
Aldrin	(ug/kg)	2	1.82J														
alpha-Chlordane	(ug/kg)	4.5		0.348J		0.72J					0.404J						
Dieldrin	(ug/kg)	2.85						1.63J									
Endosulfan II	(ug/kg)	5.5									2.83						
Endosulfan sulfate	(ug/kg)																
Endrin	(ug/kg)	2.67			[40.3]J												
gamma-Chlordane	(ug/kg)	4.5					[5.42]J										
Methoxychlor	(ug/kg)	19			5.16J	4.53J											
Aroclor 1254	(ug/kg)	34.1	23.6J								12J						
Aroclor 1260	(ug/kg)	34.1	17.3J								15J	10.7	12.1J	23.1	21.2		
Dioxin																	
2,3,7,8-TCDD	(ng/kg)	410				3.2											
1,2,3,7,8-PeCDD	(ng/kg)		2.43*		52J	46.1		13.8J	10.3	3.74*	2.14*						
1,2,3,4,7,8-HxCDD	(ng/kg)				263J	167	17.8	47.1J	30.4	8.66*						27.4	
1,2,3,6,7,8-HxCDD	(ng/kg)		25.1J		1620J	2010	280	243J	227	34.3	11.7					166	16.4
1,2,3,7,8,9-HxCDD	(ng/kg)		16.7J		660J	569	80.2	151J	88.2	26.2						66.5	
1,2,3,4,6,7,8-HpCDD	(ng/kg)		928J	19.8	65200J	52800	6820	5360	2440	1100	186	81.1J	32.5J	31.9		3600	812
OCDD	(ng/kg)		6550J	180	596000J	451000J	58600J	35100	18800	7280	1410	537	377	290J		27600	3830
2,3,7,8-TCDF	(ng/kg)		4.54J			2.63					5.76						
1,2,3,7,8-PeCDF	(ng/kg)		2.81*		8.63J	9.79			3.54								
2,3,4,7,8-PeCDF	(ng/kg)				12J	12		2.24J	5.56		0.957*						

Table 4.3-1
Detected Concentrations in Sediment

			SD-008	SD-008	SD-009	SD-009	SD-009	SD-010	SD-011	SD-012	SD-013	SD-013	SD-013	SD-014	SD-014	SD-015	SD-015
			D01931	D01932	D01933	D01991	D01934	D01935	D01937	D01939	D01941	D01942	D01992	D01943	D01944	D01945	D01946
		Sediment	11/8/2001	11/8/2001	11/8/2001	11/8/2001	11/8/2001	11/8/2001	11/9/2001	11/9/2001	11/9/2001	11/9/2001	11/9/2001	11/9/2001	11/9/2001	11/7/2001	11/7/2001
		Screening	0-0.5	0.5-2	0-0.5	0-0.5	0.5-1.83	0-0.5	0-0.5	0-0.5	0-0.5	0.5-2	0.5-2	0-0.5	0.5-2	0-0.5	0.5-1.67
CONSTITUENT	UNITS	Criteria	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary
1,2,3,4,7,8-HxCDF	(ng/kg)		8.94J		299J	259	63.7	46.4J	37.8	7.51*						33	
1,2,3,6,7,8-HxCDF	(ng/kg)				168J	106	140	125J	36.3	20.6*						92.8	9.28
2,3,4,6,7,8-HxCDF	(ng/kg)				79.5J	196J	8.02J	24.9J	26.6								
1,2,3,7,8,9-HxCDF	(ng/kg)					33.1			8.93								
1,2,3,4,6,7,8-HpCDF	(ng/kg)		142J		10300J	7940	1210	976	501	207	46.1	12.8	10.5	13.8	23	785	119
1,2,3,4,7,8,9-HpCDF	(ng/kg)				827J	802	152J	127	109	18	171					48.3	
OCDF	(ng/kg)		590J		60500J	47000	7220	4010	1910	800	97.7					2780	406
TCDDs (total)	(ng/kg)				172J	315J										9.44J	
PeCDDs (total)	(ng/kg)				680J	1010J		35.4J	37.8J							18.2J	5.84J
HxCDDs (Total)	(ng/kg)		132J		6850JEB	7920J	834J	1010J	880J	163J						626JEB	61.2JEB
HpCDDs (total)	(ng/kg)		1510J	33.3J	104000J	96800J	13100J	9720J	6380J	1800J	320J	123J				6510J	1240J
TCDFs (total)	(ng/kg)				49.8J		117J									111J	9.33J
PeCDFs (total)	(ng/kg)				351JEB	208J	498J	427J	80.8J	72.2J				38.3J	53.1J	384JEB	39.5JEB
HxCDFs (total)	(ng/kg)		174J	7.92J	13500J	10700J	3680J	3140J	1360J	465J						2240J	239J
HpCDFs (total)	(ng/kg)		588J	21.8J	63500J	60700J	10300J	7480J	4810J	966J	302J					4380J	572J
TEQ EMPC (ND=0) 1989	(ng/kg)	410	25J	0.38	[1800]J	[1500]J	210J	180J	100	33J	8.8J	1.5J	0.81J	0.75J	0.23	110	16
TEQ EMPC (ND=0) 1998	(ng/kg)	410	20J	0.22	[1200]J	[1000]J	150J	150J	91	28J	8.5J	0.99J	0.47J	0.49J	0.23	86	12

Table 4.3-1
Detected Concentrations in Sediment

CONSTITUENT	UNITS	Sediment Screening Criteria	SD-016 D01947 11/12/2001 0-0.5 Primary	SD-016 D01948 11/12/2001 0.5-2 Primary	SD-017 D01949 11/12/2001 0-0.5 Primary	SD-017 D01950 11/12/2001 0.5-1.25 Primary	SD-018 D01951 11/12/2001 0-0.5 Primary	SD-018 D01952 11/12/2001 0.5-2 Primary	SD-019 D01953 11/12/2001 0-0.5 Primary	SD-019 D01954 11/12/2001 0.5-1.5 Primary	SD-020 D03445 11/5/2002 0-0.5 Primary	SD-020 D03446 11/5/2002 0-0.5 Duplicate 1	SD-021 D03447 11/5/2002 0-0.5 Primary	SD-022 D03448 11/5/2002 0-0.5 Primary	SD-023 D04221 10/27/2003 0-0.5 Primary	SD-024 D04222 10/28/2003 0-0.5 Primary
VOCs																
Dichlorodifluoromethane	(ug/kg)															
Vinyl chloride	(ug/kg)	1722.7					47	650								
Fluorotrichloromethane	(ug/kg)															
1,1-Dichloroethene	(ug/kg)	31						[91]								
Freon 113	(ug/kg)															
Acetone	(ug/kg)	8.7														
Carbon disulfide	(ug/kg)	0.85														
Methyl Acetate	(ug/kg)						1400									
Methylene chloride	(ug/kg)	370														
trans-1,2-Dichloroethene	(ug/kg)	400					46	[700]								
1,1-Dichloroethane	(ug/kg)	27						[34]								
cis-1,2-Dichloroethene	(ug/kg)	400					230	[26000]J								
2-Butanone (MEK)	(ug/kg)	270														
1,1,1-trichloroethane	(ug/kg)	30						5.7	8.4							
Cyclohexane	(ug/kg)															
Trichloroethene	(ug/kg)	220					150	[28000]J								
Benzene	(ug/kg)	160														
Methylcyclohexane	(ug/kg)															
Bromodichloromethane	(ug/kg)							140								
Toluene	(ug/kg)	50					39	27EB								
Tetrachloroethene	(ug/kg)	410						66								
Chlorobenzene	(ug/kg)	410						3.2J								
Ethylbenzene	(ug/kg)	89						76								
Xylenes (total)	(ug/kg)	25	2.9J		22	3.2J	21	[230]EB								
Styrene	(ug/kg)						8.8J	3.4J								
Isopropylbenzene	(ug/kg)							15								
1,3-Dichlorobenzene	(ug/kg)	1700						7.6								
1,4-Dichlorobenzene	(ug/kg)	340					8.8J	39								
1,2-Dichlorobenzene	(ug/kg)	330						21		3.4J						
1,2,4-Trichlorobenzene	(ug/kg)	9600						26	19	59						
SVOCs																
Benzaldehyde	(ug/kg)			12J	19J				88J				1500J	2700J		1800J
Phenol	(ug/kg)	420						[1500]J								180JEB
2-Methylphenol	(ug/kg)	12						[22]J			5.5JEB	6.4JEB	[42]EB	[140]JEB	[15]JEB	[28]JEB
Acetophenone	(ug/kg)															160JEB
4-Methylphenol	(ug/kg)	670												320J		
2,4-Dichlorophenol	(ug/kg)															
Naphthalene	(ug/kg)	240			17J		[1200]J	230J			120JEB	140JEB	[780]	[1100]	[250]J	210J
2-Methylnaphthalene	(ug/kg)				10J		710J	140J					450	520	100J	290J
2,4,6-Trichlorophenol	(ug/kg)															
2,4,5-Trichlorophenol	(ug/kg)															
Biphenyl	(ug/kg)	1100			20J		270J						230J	360J		
Acenaphthylene	(ug/kg)				57J								180J	300J		300J
Acenaphthene	(ug/kg)				16J		3700J	230J	25J							150J
2,3,5,6-Tetrachlorophenol	(ug/kg)															
Dibenzofuran	(ug/kg)	420			19J		[1900]J	150J	10J				160J			130J
Diethylphthalate	(ug/kg)	600	26J	18J						19J					130JEB	330JEB
Fluorene	(ug/kg)	540			49J		[3500]J	280J	22J					220J		220J
Pentachlorophenol	(ug/kg)	360											160J			[550]J
Phenanthrene	(ug/kg)	41.9	23J		[580]J	[1300]J	[35000]J	[3500]J	[460]J	[56]J	[150]J	[330]J	[880]	[1500]J	[340]J	[3600]J
Anthracene	(ug/kg)	220			70J		[4400]J	[480]J	52J		23J	64J	[250]J	[510]J	130J	[560]J
Carbazole	(ug/kg)				60J		4500J	180J	31J							510J
Di-n-butylphthalate	(ug/kg)	11000				230J										110J
Fluoranthene	(ug/kg)	111	21J	2.4JEB	[910]J	[1900]JEB	[36000]J	[2400]J	[680]J	62J	[200]J	[630]J	[1300]	[2400]	[870]J	[10000]J
Pyrene	(ug/kg)	53	31J	2.5JEB	[910]J	[1900]JEB	[45000]J	[3700]J	[700]J	[84]J	[120]J	[410]J	[1100]	[2400]	[800]J	[9600]J
Butylbenzylphthalate	(ug/kg)	11000	20J													180J
Benzo(a)anthracene	(ug/kg)	31.7	9.1JEB	1JEB	[530]J	[730]J	[22000]J	[1100]J	[350]J	28J	[80]J	[330]J	[670]J	[880]	[380]J	[2700]J

Table 4.3-1
Detected Concentrations in Sediment

			SD-016	SD-016	SD-017	SD-017	SD-018	SD-018	SD-019	SD-019	SD-020	SD-020	SD-021	SD-022	SD-023	SD-024
			D01947	D01948	D01949	D01950	D01951	D01952	D01953	D01954	D03445	D03446	D03447	D03448	D04221	D04222
		Sediment	11/12/2001	11/12/2001	11/12/2001	11/12/2001	11/12/2001	11/12/2001	11/12/2001	11/12/2001	11/5/2002	11/5/2002	11/5/2002	11/5/2002	10/27/2003	10/28/2003
		Screening	0-0.5	0.5-2	0-0.5	0.5-1.25	0-0.5	0.5-2	0-0.5	0.5-1.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
CONSTITUENT	UNITS	Criteria	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary
Chrysene	(ug/kg)	57.1	20J	1.2JEB	[440]J	[930]J	[17000]J	[1500]J	[230]J	35J	[120]J	[350]J	[990]	[1700]	[540]J	[4600]J
bis(2-Ethylhexyl) phthalate	(ug/kg)	890000			900J							97J	210J	450J		4800J
Di-n-octylphthalate	(ug/kg)	11600000000	12J		290J								630	750		
Benzo(b)fluoranthene	(ug/kg)	37	6.9JEB	1.5JEB	[670]J	[990]JEB	[22000]J	[960]J	[350]J	[39]J	[82]J	[240]J	[1500]J	[1500]J	[680]J	[7700]J
Benzo(k)fluoranthene	(ug/kg)	37	5.4JEB	0.99JEB	[320]J	[650]J	[7800]J	[860]J	[120]J	26J	[89]J	[410]J	[870]J	[1300]	[360]J	[9600]J
Benzo(a)pyrene	(ug/kg)	31.9	8.6JEB	2.1JEB	[430]J	[720]J	[13000]J	[1100]J	[190]J	27J	[72]J	[340]J	[990]J	[1200]J	[450]J	[4200]J
Indeno(1,2,3-cd)pyrene	(ug/kg)	30			[220]J	[350]J	[10000]J	[480]J	[170]J	13J	[56]J	[190]J	[200]J	[180]J	[200]J	[980]J
Dibenz(a,h) anthracene	(ug/kg)	10	0.68JEB		[68]J	[110]JEB	[2600]J	[29]J	[45]J	2.8J	[21]J	[66]J	[88]J	[65]J	[53]J	[210]J
Benzo(g,h,i)perylene	(ug/kg)	170			160J	[290]J	[8500]J	[410]J	120J	11J	52J	160J	140J	130J	160J	[640]J
Metals																
Aluminum	(mg/kg)	14000	2830	5360	2640	3080	6140	4330	8360	8580	2500EB	2300EB	6800EB	12000EB	6600	[14000]
Antimony	(mg/kg)	64			2.4J	2J	1.9J	0.33J					4.1J	18J	1.2N	4.1N
Arsenic	(mg/kg)	5.9	0.29	1.1	0.94	1.1	[8.5]	0.95	0.76	0.82	0.98J	0.87J	5.5J	[12]J	[7.4]*	[27]*
Barium	(mg/kg)	20	[22.1]	[26.9]	[31.3]	[25.2]	[77.1]	[35]J	[39.1]J	[33.9]J	[32]J	[28]J	[93]J	[100]J	[76]J	[240]
Beryllium	(mg/kg)		0.19	0.28	0.15	0.16	0.4	0.22	0.31	0.26	0.33J	0.3J	1.1	1.8	0.69J	2.6
Cadmium	(mg/kg)	0.6	0.05J	0.13J	0.24J	0.18J	[0.86]J	0.49J	0.1J	0.07J	0.14J	0.15J	[1.3]J	[6.8]J	[3.2]	[10]
Calcium	(mg/kg)		710	1400	1080	1130	1430	932EB	1310EB	1660EB	1100J	930J	3000	6000	2300	5600
Chromium(total)	(mg/kg)	37.3	5.6	13.1	9.5	7.3	23.8	10.1	9	8.6	11J	9.5J	[65]J	[330]J	24	[68]
Cobalt	(mg/kg)		1.9	4.9	3.1	4	6.9	4.6	3.5	3.7	1.8J	1.7J	4.1J	12J	8J	23
Copper	(mg/kg)	35.7	3.8	10.9	10.4	9.2	[86.9]	[37.8]	8.5	8	14J	11J	[97]J	[270]J	[52]	[150]
Iron	(mg/kg)		3850	7980	6730	6650	22800	9570	12600	13200	4300	4400	5600	21000	14000	31000
Lead	(mg/kg)	35	6.8	6.7	[46.5]	15.4	[144]	[48.3]	[60.6]	18.8	[42]	[36]	[180]	[210]	[120]E	[440]E
Magnesium	(mg/kg)		1030	2260	983	1410	1410	1240	1950	2390	830J	800J	810J	930J	1600	2600
Manganese	(mg/kg)	460	134	101	319	243	[606]	194	302	234	81JEB	78JEB	77JEB	320JEB	[560]	[1800]
Mercury	(mg/kg)	0.17			0.05	0.03		0.03	0.03	0.01J	0.097	0.11	[0.74]	[1.5]	[0.22]E	[0.22]E
Nickel	(mg/kg)	18	3J	8.8J	4.5J	4.4J	[20.5]J	6.9	7.3	6.7	3.7JEB	3.1JEB	12JEB	[26]JEB	[34]	[40]
Potassium	(mg/kg)		117	454	119	139	139	263	320	270			280J		380JE	730JE
Selenium	(mg/kg)	0.1									[0.53]J	[0.37]J	[2.2]	[3.9]	[0.68]J	[2.6]
Silver	(mg/kg)	4.5	0.08J	0.04J	0.66J	0.76J	[8.9]J	0.41	0.08	0.05					[5.1]	[12]
Sodium	(mg/kg)		69.2	97.3	75.2	68.6	93.5	60.5	84.3	70.2			400J	630J	210J	820J
Thallium	(mg/kg)			0.1J			0.04J	0.06	0.03J	0.03J	0.05J	0.017J	0.15J	0.32J	0.098J	0.26J
Vanadium	(mg/kg)		10.1	24.3	8.3	10	24.3	12.5J	17.9J	19.2J	8.4J	7.7J	30J	37J	19	57
Zinc	(mg/kg)	123	14	31.8	40.5	37.4	[188]	73.5J	61.1J	49.4J	28J	27J	120J	[990]J	[270]	[630]
Pesticides/PCBs																
4,4'-DDD	(ug/kg)	3.54			[5.22]	[8.25]J			1.19J							
4,4'-DDE	(ug/kg)	1.42			[4.11]	[5.89]J	[6.6]J		[3.37]J	1.01J						
4,4'-DDT	(ug/kg)	6.98			5.28	[11]J	[12.9]J		0.824J							
Aldrin	(ug/kg)	2				0.495J										
alpha-Chlordane	(ug/kg)	4.5				0.483J										
Dieldrin	(ug/kg)	2.85	0.676J						[4.86]J	1.22J						
Endosulfan II	(ug/kg)	5.5					[12.5]J	1.2J								
Endosulfan sulfate	(ug/kg)															
Endrin	(ug/kg)	2.67						[3.67]J								
gamma-Chlordane	(ug/kg)	4.5														
Methoxychlor	(ug/kg)	19														
Aroclor 1254	(ug/kg)	34.1			10.5	11.4	[242]J	15.2J								
Aroclor 1260	(ug/kg)	34.1			13.9J	10.5J		11.6								
Dioxin																
2,3,7,8-TCDD	(ng/kg)	410									0.751JEB	0.950EB	2.4EB	3.05JEB	2.57EB	0.3EB*
1,2,3,7,8-PeCDD	(ng/kg)										2.91J	5.09J	11	14.7	20.5	8.92J
1,2,3,4,7,8-HxCDD	(ng/kg)										16.7J	31.2J	16.4	15.7	70.9	33.8J
1,2,3,6,7,8-HxCDD	(ng/kg)						10.4				13.6	15.4	48.6	55.5	261	136J
1,2,3,7,8,9-HxCDD	(ng/kg)										24.1	36.3	48	41.3	156	71.3J
1,2,3,4,6,7,8-HpCDD	(ng/kg)				61.3	56.9	188J	12.5			414	486	1370	1170	7230	3730J
OCDD	(ng/kg)				377	381	1320J				1870J	1970J	9430J	6780J	48100J	24400J
2,3,7,8-TCDF	(ng/kg)						18.6	69.3			7.02J	6.14	14.3	28.1	4.3	2.26J
1,2,3,7,8-PeCDF	(ng/kg)							10.3			2.18	1.97	7.42	36	3.96	2.88J
2,3,4,7,8-PeCDF	(ng/kg)							6.03			2.24	2.02	7.83	28.9	5.31	3.86J

Table 4.3-1

Detected Concentrations in Sediment

			SD-016	SD-016	SD-017	SD-017	SD-018	SD-018	SD-019	SD-019	SD-020	SD-020	SD-021	SD-022	SD-023	SD-024
			D01947	D01948	D01949	D01950	D01951	D01952	D01953	D01954	D03445	D03446	D03447	D03448	D04221	D04222
		Sediment	11/12/2001	11/12/2001	11/12/2001	11/12/2001	11/12/2001	11/12/2001	11/12/2001	11/12/2001	11/5/2002	11/5/2002	11/5/2002	11/5/2002	10/27/2003	10/28/2003
		Screening	0-0.5	0.5-2	0-0.5	0.5-1.25	0-0.5	0.5-2	0-0.5	0.5-1.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
CONSTITUENT	UNITS	Criteria	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary
1,2,3,4,7,8-HxCDF	(ng/kg)						8.04				7.47	7.17	32.5	119	48.8	29.1J
1,2,3,6,7,8-HxCDF	(ng/kg)										4.98	5.25	23.5	92.7	30.9	18.7J
2,3,4,6,7,8-HxCDF	(ng/kg)													79.6	14.5	13J
1,2,3,7,8,9-HxCDF	(ng/kg)													8.72	1.38J	
1,2,3,4,6,7,8-HpCDF	(ng/kg)				22.9	19	624J	20.3	15.6J	13.8J	87.9J	72.3J	353J	1040J	884	668J
1,2,3,4,7,8,9-HpCDF	(ng/kg)										12.9J	9.13	37.6J	135	96.4	64.8J
OCDF	(ng/kg)						258J				133	110	621	925	4720	2550J
TCDDs (total)	(ng/kg)										13.2J	19.8J	30.6J	29.8J	39.2J	17.8J
PeCDDs (total)	(ng/kg)						23.2J				39.1J	65J	59.9J	90.7J	178J	89.3J
HxCDDs (Total)	(ng/kg)										153JEB	220JEB	360JEB	451JEB	1400J	728J
HpCDDs (total)	(ng/kg)						385J	12.5J			625J	711J	2250J	2010J	12400J	6390J
TCDFs (total)	(ng/kg)							141J			36.8J	40J	130J	276J	82.2J	52.5J
PeCDFs (total)	(ng/kg)						23.4J	31.5J			43.7J	35.4J	191J	526J	261J	178J
HxCDFs (total)	(ng/kg)						227J				147J	115J	523J	1580J	1580J	939J
HpCDFs (total)	(ng/kg)				56.2J	59.2J	1130J				323J	211J	1050J	2560J	5580J	3310J
TEQ EMPC (ND=0) 1989	(ng/kg)	410			1.2	1.1	13J	11	0.16J	0.14J	18J	22J	59J	100J		
TEQ EMPC (ND=0) 1998	(ng/kg)	410			0.88	0.8	12J	11	0.16J	0.14J	18J	23J	56J	100J	170J	89J

Table 4.3-1
Detected Concentrations in Sediment

			SD-024	SD-025	SD-026	SD-027	SOIL#1	SOIL#2	SOIL#3	SOIL#4	SOIL#5	SOIL#6	SOIL#7	SOIL#8	SOIL#9
			D04227	D04223	D04224	D04225	Soil #1	Soil #2	Soil #3	Soil #4	Soil #5	Soil #6	Soil #7	Soil #8	Soil #9
		Sediment	10/28/2003	10/28/2003	10/27/2003	10/27/2003	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989
		Screening	0-0.5	0-0.5	0-0.5	0-0.5	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
CONSTITUENT	UNITS	Criteria	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs															
Dichlorodifluoromethane	(ug/kg)														
Vinyl chloride	(ug/kg)	1722.7													
Fluorotrichloromethane	(ug/kg)														
1,1-Dichloroethene	(ug/kg)	31													
Freon 113	(ug/kg)														
Acetone	(ug/kg)	8.7													
Carbon disulfide	(ug/kg)	0.85													
Methyl Acetate	(ug/kg)														
Methylene chloride	(ug/kg)	370													
trans-1,2-Dichloroethene	(ug/kg)	400													
1,1-Dichloroethane	(ug/kg)	27													
cis-1,2-Dichloroethene	(ug/kg)	400													
2-Butanone (MEK)	(ug/kg)	270													
1,1,1-trichloroethane	(ug/kg)	30													
Cyclohexane	(ug/kg)														
Trichloroethene	(ug/kg)	220													
Benzene	(ug/kg)	160													
Methylcyclohexane	(ug/kg)														
Bromodichloromethane	(ug/kg)														
Toluene	(ug/kg)	50						43	[85.8]	40.4		37.8	25.2		
Tetrachloroethene	(ug/kg)	410													
Chlorobenzene	(ug/kg)	410													
Ethylbenzene	(ug/kg)	89													
Xylenes (total)	(ug/kg)	25													
Styrene	(ug/kg)														
Isopropylbenzene	(ug/kg)														
1,3-Dichlorobenzene	(ug/kg)	1700													
1,4-Dichlorobenzene	(ug/kg)	340													
1,2-Dichlorobenzene	(ug/kg)	330													
1,2,4-Trichlorobenzene	(ug/kg)	9600													
SVOCs															
Benzaldehyde	(ug/kg)			1900J											
Phenol	(ug/kg)	420	150JEB	180JEB											
2-Methylphenol	(ug/kg)	12	[22]JEB	[26]JEB	9.8JEB	7.2JEB									
Acetophenone	(ug/kg)		100JEB	120JEB											
4-Methylphenol	(ug/kg)	670		81JEB											
2,4-Dichlorophenol	(ug/kg)											2072		4534	
Naphthalene	(ug/kg)	240	150JEB	200J	220J	9.9JEB									
2-Methylnaphthalene	(ug/kg)		210J	270J	250J										
2,4,6-Trichlorophenol	(ug/kg)														
2,4,5-Trichlorophenol	(ug/kg)														
Biphenyl	(ug/kg)	1100			62J										
Acenaphthylene	(ug/kg)		270J	280J	81J										
Acenaphthene	(ug/kg)		120J	110J											
2,3,5,6-Tetrachlorophenol	(ug/kg)			65J			366			708	469	262	1086	360	517
Dibenzofuran	(ug/kg)	420	98J	120J	70J										
Diethylphthalate	(ug/kg)	600		140JEB											
Fluorene	(ug/kg)	540	180J	200J											
Pentachlorophenol	(ug/kg)	360	[410]J	[470]J	[1000]J		[5429]	[4920]	[1430]	[3799]	[6233]	[1393]	[7905]	[4116]	[4984]
Phenanthrene	(ug/kg)	41.9	[3000]J	[3900]J	[480]J	[110]J									
Anthracene	(ug/kg)	220	[510]J	[480]J	110J	25J									
Carbazole	(ug/kg)		440J	520J	86J										
Di-n-butylphthalate	(ug/kg)	11000	81J	95J	79J										
Fluoranthene	(ug/kg)	111	[8600]J	[9700]J	[1100]J	[210]J									
Pyrene	(ug/kg)	53	[10000]J	[8600]J	[860]J	[220]J									
Butylbenzylphthalate	(ug/kg)	11000	300J												
Benzo(a)anthracene	(ug/kg)	31.7	[2300]J	[2400]J	[330]J	[90]J									

Table 4.3-1
Detected Concentrations in Sediment

			SD-024	SD-025	SD-026	SD-027	SOIL#1	SOIL#2	SOIL#3	SOIL#4	SOIL#5	SOIL#6	SOIL#7	SOIL#8	SOIL#9
			D04227	D04223	D04224	D04225	Soil #1	Soil #2	Soil #3	Soil #4	Soil #5	Soil #6	Soil #7	Soil #8	Soil #9
		Sediment	10/28/2003	10/28/2003	10/27/2003	10/27/2003	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989
		Screening	0-0.5	0-0.5	0-0.5	0-0.5	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
CONSTITUENT	UNITS	Criteria	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Chrysene	(ug/kg)	57.1	[4100]J	[4500]J	[560]J	[110]J									
bis(2-Ethylhexyl) phthalate	(ug/kg)	890000	4900J	5400J											
Di-n-octylphthalate	(ug/kg)	11600000000				1000J									
Benzo(b)fluoranthene	(ug/kg)	37	[7400]J	[8200]J	[530]J	[130]J									
Benzo(k)fluoranthene	(ug/kg)	37	[7200]J	[8300]J	[390]J	[46]J									
Benzo(a)pyrene	(ug/kg)	31.9	[3700]J	[3900]J	[280]J	[84]J									
Indeno(1,2,3-cd)pyrene	(ug/kg)	30	[1300]J	[1300]J	[180]J	[35]J									
Dibenz(a,h) anthracene	(ug/kg)	10	[230]J	[220]J	[49]J										
Benzo(g,h,i)perylene	(ug/kg)	170	[850]J	[850]J	140J	.									
Metals															
Aluminum	(mg/kg)	14000	12000	12000	3400	3200									
Antimony	(mg/kg)	64	4.1N	4N	1N	2.1N									
Arsenic	(mg/kg)	5.9	[25]*	[19]*	[65]*	1.9*									
Barium	(mg/kg)	20	[220]	[220]	[41]	[52]J									
Beryllium	(mg/kg)		2.4	2.3	0.36J	0.33J									
Cadmium	(mg/kg)	0.6	[8.8]	[8.2]	0.13J	0.33J									
Calcium	(mg/kg)		5100	4500	880	1600									
Chromium(total)	(mg/kg)	37.3	[60]	[55]	9.4	14									
Cobalt	(mg/kg)		21	21	2.9J	3J									
Copper	(mg/kg)	35.7	[130]	[120]	12	13									
Iron	(mg/kg)		28000	25000	14000	8900									
Lead	(mg/kg)	35	[410]E	[300]E	[52]E	25E									
Magnesium	(mg/kg)		2400	2200	1400	680J									
Manganese	(mg/kg)	460	[1600]	[1500]	360	[1100]									
Mercury	(mg/kg)	0.17	[0.21]E	0.014E	0.071E	0.13E									
Nickel	(mg/kg)	18	[37]	[33]	7.6	3.6J									
Potassium	(mg/kg)			680JE	280JE	150JE									
Selenium	(mg/kg)	0.1	[2.1]	[2]	[0.16]J	[0.5]J									
Silver	(mg/kg)	4.5	[11]	[11]	0.93J	2.3									
Sodium	(mg/kg)		740J	630J	64J	140J									
Thallium	(mg/kg)		0.23J	0.21J	0.035J	0.034J									
Vanadium	(mg/kg)		46	44	8.8	9.1J									
Zinc	(mg/kg)	123	[550]	[480]	46	42									
Pesticides/PCBs															
4,4'-DDD	(ug/kg)	3.54													
4,4'-DDE	(ug/kg)	1.42													
4,4'-DDT	(ug/kg)	6.98													
Aldrin	(ug/kg)	2													
alpha-Chlordane	(ug/kg)	4.5													
Dieldrin	(ug/kg)	2.85													
Endosulfan II	(ug/kg)	5.5													
Endosulfan sulfate	(ug/kg)														
Endrin	(ug/kg)	2.67													
gamma-Chlordane	(ug/kg)	4.5													
Methoxychlor	(ug/kg)	19													
Aroclor 1254	(ug/kg)	34.1													
Aroclor 1260	(ug/kg)	34.1													
Dioxin															
2,3,7,8-TCDD	(ng/kg)	410	2.54JEB	2.85EB	3.29EB										
1,2,3,7,8-PeCDD	(ng/kg)		17.7J	17.3	18.6										
1,2,3,4,7,8-HxCDD	(ng/kg)		69.6J	65.1	91.4	1.19J									
1,2,3,6,7,8-HxCDD	(ng/kg)		276J	250	582	3.82									
1,2,3,7,8,9-HxCDD	(ng/kg)		140J	137	234	4.14									
1,2,3,4,6,7,8-HpCDD	(ng/kg)		9570J	8240	15600	71.7									
OCDD	(ng/kg)		63500J	54800J	120000J	352									
2,3,7,8-TCDF	(ng/kg)		5.23J	5.42	1.2*	1.54									
1,2,3,7,8-PeCDF	(ng/kg)		5.61J	4.95	3.88	0.956J									
2,3,4,7,8-PeCDF	(ng/kg)		6.78J	6.21	4.29	1.13									

Table 4.3-1
Detected Concentrations in Sediment

			SD-024	SD-025	SD-026	SD-027	SOIL#1	SOIL#2	SOIL#3	SOIL#4	SOIL#5	SOIL#6	SOIL#7	SOIL#8	SOIL#9
			D04227	D04223	D04224	D04225	Soil #1	Soil #2	Soil #3	Soil #4	Soil #5	Soil #6	Soil #7	Soil #8	Soil #9
		Sediment	10/28/2003	10/28/2003	10/27/2003	10/27/2003	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989	12/31/1989
		Screening	0-0.5	0-0.5	0-0.5	0-0.5	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
CONSTITUENT	UNITS	Criteria	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
1,2,3,4,7,8-HxCDF	(ng/kg)		63.3J	59.7	97.1	3.86									
1,2,3,6,7,8-HxCDF	(ng/kg)		36.1J	35.8	46.7	2.57									
2,3,4,6,7,8-HxCDF	(ng/kg)		23.2J	23.4	26.4	1.58J									
1,2,3,7,8,9-HxCDF	(ng/kg)		1.59J	1.2J	1.44J										
1,2,3,4,6,7,8-HpCDF	(ng/kg)		1420J	1280	2100	129									
1,2,3,4,7,8,9-HpCDF	(ng/kg)		112J	124	312	3.14									
OCDF	(ng/kg)		6600J	5830	13500	53.5									
TCDDs (total)	(ng/kg)		34.9J	33.6J	140J	2.31J									
PeCDDs (total)	(ng/kg)		173J	167J	532J	5.29J									
HxCDDs (Total)	(ng/kg)		1480J	1380J	3270J	30.7J									
HpCDDs (total)	(ng/kg)		15200J	13600J	30000J	126J									
TCDFs (total)	(ng/kg)		91.1J	102J	44.8J	10.4J									
PeCDFs (total)	(ng/kg)		343J	325J	394J	20.8J									
HxCDFs (total)	(ng/kg)		2020J	1940J	4540J	71.3J									
HpCDFs (total)	(ng/kg)		6860J	6860J	20200J	217J									
TEQ EMPC (ND=0) 1989	(ng/kg)	410													
TEQ EMPC (ND=0) 1998	(ng/kg)	410	200J	180J	320J	4.6J									

Table 4.3-1
Detected Concentrations in Sediment

CONSTITUENT	UNITS	Sediment Screening Criteria	SOIL_NEAR_MW-9 6/11/1998 0-1 Primary	VP-001 D02526 4/25/2002 0-0.5 Primary	VP-001 D02527 4/25/2002 0-0.5 Duplicate 1	VP-002 D02528 4/25/2002 0-0.5 Primary
VOCs						
Dichlorodifluoromethane	(ug/kg)					
Vinyl chloride	(ug/kg)	1722.7				
Fluorotrichloromethane	(ug/kg)					
1,1-Dichloroethene	(ug/kg)	31				
Freon 113	(ug/kg)					
Acetone	(ug/kg)	8.7				
Carbon disulfide	(ug/kg)	0.85				
Methyl Acetate	(ug/kg)					
Methylene chloride	(ug/kg)	370				
trans-1,2-Dichloroethene	(ug/kg)	400				
1,1-Dichloroethane	(ug/kg)	27				
cis-1,2-Dichloroethene	(ug/kg)	400				
2-Butanone (MEK)	(ug/kg)	270				
1,1,1-trichloroethane	(ug/kg)	30				
Cyclohexane	(ug/kg)					
Trichloroethene	(ug/kg)	220				
Benzene	(ug/kg)	160				
Methylcyclohexane	(ug/kg)					
Bromodichloromethane	(ug/kg)					
Toluene	(ug/kg)	50				
Tetrachloroethene	(ug/kg)	410				
Chlorobenzene	(ug/kg)	410				
Ethylbenzene	(ug/kg)	89				
Xylenes (total)	(ug/kg)	25				
Styrene	(ug/kg)					
Isopropylbenzene	(ug/kg)					
1,3-Dichlorobenzene	(ug/kg)	1700				
1,4-Dichlorobenzene	(ug/kg)	340				
1,2-Dichlorobenzene	(ug/kg)	330				
1,2,4-Trichlorobenzene	(ug/kg)	9600				
SVOCs						
Benzaldehyde	(ug/kg)			1000J	1600J	
Phenol	(ug/kg)	420				
2-Methylphenol	(ug/kg)	12				
Acetophenone	(ug/kg)			3000JEB	890JEB	270JEB
4-Methylphenol	(ug/kg)	670				
2,4-Dichlorophenol	(ug/kg)					
Naphthalene	(ug/kg)	240				[520]J
2-Methylnaphthalene	(ug/kg)					2000J
2,4,6-Trichlorophenol	(ug/kg)					500J
2,4,5-Trichlorophenol	(ug/kg)					4000J
Biphenyl	(ug/kg)	1100				620J
Acenaphthylene	(ug/kg)					
Acenaphthene	(ug/kg)					260J
2,3,5,6-Tetrachlorophenol	(ug/kg)					9900J
Dibenzofuran	(ug/kg)	420				[440]J
Diethylphthalate	(ug/kg)	600		[3300]JEB	450JEB	
Fluorene	(ug/kg)	540				[960]J
Pentachlorophenol	(ug/kg)	360		[640]J	[930]J	[690000]J
Phenanthrene	(ug/kg)	41.9		[400]J	[480]J	[570]J
Anthracene	(ug/kg)	220				
Carbazole	(ug/kg)					
Di-n-butylphthalate	(ug/kg)	11000				
Fluoranthene	(ug/kg)	111		[480]J	[550]J	
Pyrene	(ug/kg)	53		[770]	[960]	[250]J
Butylbenzylphthalate	(ug/kg)	11000				460J
Benzo(a)anthracene	(ug/kg)	31.7		[390]J	[400]	

Table 4.3-1
Detected Concentrations in Sediment

			SOIL_NEAR_MW-9	VP-001	VP-001	VP-002
				D02526	D02527	D02528
		Sediment	6/11/1998	4/25/2002	4/25/2002	4/25/2002
		Screening	0-1	0-0.5	0-0.5	0-0.5
CONSTITUENT	UNITS	Criteria	Primary	Primary	Duplicate 1	Primary
Chrysene	(ug/kg)	57.1		[320]J	[360]J	
bis(2-Ethylhexyl) phthalate	(ug/kg)	890000				
Di-n-octylphthalate	(ug/kg)	11600000000				370J
Benzo(b)fluoranthene	(ug/kg)	37		[510]J	[540]J	
Benzo(k)fluoranthene	(ug/kg)	37		[340]J	[350]J	
Benzo(a)pyrene	(ug/kg)	31.9				
Indeno(1,2,3-cd)pyrene	(ug/kg)	30				
Dibenz(a,h) anthracene	(ug/kg)	10				
Benzo(g,h,i)perylene	(ug/kg)	170				
Metals						
Aluminum	(mg/kg)	14000		5320	3480	5150
Antimony	(mg/kg)	64		3.1J	1.8J	0.36J
Arsenic	(mg/kg)	5.9		1.9	1.2	0.88
Barium	(mg/kg)	20		[101]	[65.9]	[28]
Beryllium	(mg/kg)			3J	2J	1.5J
Cadmium	(mg/kg)	0.6		[1.3]	[0.88]	[0.96]
Calcium	(mg/kg)			4520	2740	3030
Chromium(total)	(mg/kg)	37.3		9.1	6	20.1
Cobalt	(mg/kg)			5.9	3.9	3
Copper	(mg/kg)	35.7		[44.8]	29	16
Iron	(mg/kg)			2160	1400	8780
Lead	(mg/kg)	35		[129]	[78.7]	17
Magnesium	(mg/kg)			451	282	525
Manganese	(mg/kg)	460		18.1	11.5	246
Mercury	(mg/kg)	0.17		0.01		0.07
Nickel	(mg/kg)	18		16.8	10.8	6.6
Potassium	(mg/kg)			236	157	89.8
Selenium	(mg/kg)	0.1		[4]	[2.8]	[3.4]
Silver	(mg/kg)	4.5			0.02J	0.07
Sodium	(mg/kg)			163	110	82
Thallium	(mg/kg)					
Vanadium	(mg/kg)			38.3	24.1	9.6
Zinc	(mg/kg)	123		55.9	37.6	22.8
Pesticides/PCBs						
4,4'-DDD	(ug/kg)	3.54				
4,4'-DDE	(ug/kg)	1.42				
4,4'-DDT	(ug/kg)	6.98				
Aldrin	(ug/kg)	2				
alpha-Chlordane	(ug/kg)	4.5				
Dieldrin	(ug/kg)	2.85				
Endosulfan II	(ug/kg)	5.5				
Endosulfan sulfate	(ug/kg)					
Endrin	(ug/kg)	2.67				
gamma-Chlordane	(ug/kg)	4.5				
Methoxychlor	(ug/kg)	19				
Aroclor 1254	(ug/kg)	34.1				
Aroclor 1260	(ug/kg)	34.1				
Dioxin						
2,3,7,8-TCDD	(ng/kg)	410				
1,2,3,7,8-PeCDD	(ng/kg)					
1,2,3,4,7,8-HxCDD	(ng/kg)					
1,2,3,6,7,8-HxCDD	(ng/kg)					
1,2,3,7,8,9-HxCDD	(ng/kg)					
1,2,3,4,6,7,8-HpCDD	(ng/kg)					
OCDD	(ng/kg)					
2,3,7,8-TCDF	(ng/kg)					
1,2,3,7,8-PeCDF	(ng/kg)					
2,3,4,7,8-PeCDF	(ng/kg)					

Table 4.3-1
Detected Concentrations in Sediment

			SOIL_NEAR_MW-9	VP-001	VP-001	VP-002
				D02526	D02527	D02528
		Sediment	6/11/1998	4/25/2002	4/25/2002	4/25/2002
		Screening	0-1	0-0.5	0-0.5	0-0.5
CONSTITUENT	UNITS	Criteria	Primary	Primary	Duplicate 1	Primary
1,2,3,4,7,8-HxCDF	(ng/kg)					
1,2,3,6,7,8-HxCDF	(ng/kg)					
2,3,4,6,7,8-HxCDF	(ng/kg)					
1,2,3,7,8,9-HxCDF	(ng/kg)					
1,2,3,4,6,7,8-HpCDF	(ng/kg)					
1,2,3,4,7,8,9-HpCDF	(ng/kg)					
OCDF	(ng/kg)					
TCDDs (total)	(ng/kg)					
PeCDDs (total)	(ng/kg)		15			
HxCDDs (Total)	(ng/kg)					
HpCDDs (total)	(ng/kg)		3290			
TCDFs (total)	(ng/kg)					
PeCDFs (total)	(ng/kg)		155			
HxCDFs (total)	(ng/kg)		1120			
HpCDFs (total)	(ng/kg)		3750			
TEQ EMPC (ND=0) 1989	(ng/kg)	410				
TEQ EMPC (ND=0) 1998	(ng/kg)	410				

Table 4.4-1
Detected Concentrations in Surface Water

			BRIDGE	COUNTY_BRIDGE	FP	RMFD_RVR_DWNSTR	RRHP03-W	RRKP-W	RRUS-W	SW-001	SW-004	SW-005	SW-006	SW-007	SW-008
		Surface Water							RRUS-2W	D01893	D01894	D01895	D01896	D01897	D01898
		Screening	6/30/1998	6/30/1998	10/16/1998	6/30/1998	10/16/1998	10/16/1998	10/16/1998	11/6/2001	11/6/2001	11/6/2001	11/7/2001	11/7/2001	11/7/2001
CONSTITUENT	UNITS	Criteria	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary
VOCs															
1,1,2-Trichloroethane	(ug/l)	1200												0.62	
SVOCs															
Benzaldehyde	(ug/l)														
4-Methylphenol	(ug/l)														
Isophorone	(ug/l)														0.27J
2,4-Dichlorophenol	(ug/l)	365													
Naphthalene	(ug/l)	12													
2,4,6-Trichlorophenol	(ug/l)	970													
2,4,5-Trichlorophenol	(ug/l)	63													
2,6-Dinitrotoluene	(ug/l)														
Fluorene	(ug/l)	3.9													
4,6-Dinitro-2-methylphenol	(ug/l)														
Atrazine	(ug/l)														0.33J
Pentachlorophenol	(ug/l)	15								1.2J	11	0.0053J		[28]	1.4J
Phenanthrene	(ug/l)	6.3													
Anthracene	(ug/l)	0.73													
Carbazole	(ug/l)														0.45J
Di-n-butylphthalate	(ug/l)	35								0.26J		0.26J			0.44J
Fluoranthene	(ug/l)	6.16													0.38J
Pyrene	(ug/l)														0.61J
Butylbenzylphthalate	(ug/l)	19										0.28J			1.4J
Benzo(a)anthracene	(ug/l)	0.027										0.011J			0.0094J
Chrysene	(ug/l)											0.017J			0.015J
bis(2-Ethylhexyl) phthalate	(ug/l)	3													
Di-n-octylphthalate	(ug/l)														2.2J
Benzo(b)fluoranthene	(ug/l)											0.017J			1.8J
Benzo(k)fluoranthene	(ug/l)											0.014J			1.4J
Benzo(a)pyrene	(ug/l)	0.014										0.011J			[0.61]J
Indeno(1,2,3-cd)pyrene	(ug/l)											0.013J			0.6J
Dibenzo(a,h)anthracene	(ug/l)												0.0075J	0.005J	0.44J
Benzo(g,h,i)perylene	(ug/l)														0.54J
2,3,5,6-Tetrachlorophenol	(ug/l)										0.33J				
3,4-Dimethylphenol	(ug/l)														
Metals/Cyanide															
Aluminum	(ug/l)	87								12.6J	20.4	12.8J	16	23.7	[631]
Antimony	(ug/l)	30								0.35J	0.33J	0.43J		0.35J	0.97
Arsenic	(ug/l)	150								1.1	1.4	0.1	1.4	1.4	4.1
Barium	(ug/l)	4	[20.0]	[17.0]		[18.0]				[34.8]	[28.3]	[57.2]	[70.1]	[16.5]	[29.8]
Beryllium	(ug/l)	0.66													0.15J
Cadmium	(ug/l)	0.25										0.07J			0.18
Calcium	(ug/l)									17400	15700	23900	33600	11300	10000
Chromium(total)	(ug/l)	74													4.2J
Cobalt	(ug/l)	23													2.5
Copper	(ug/l)	9								1.4J	1.5J	1.6J		1.3J	6.9
Iron	(ug/l)	1000								234	424	83.5		482	[7510]
Lead	(ug/l)	2.5								0.27	0.23	0.13J	0.2J	0.23	[5.9]
Magnesium	(ug/l)									3270	3010	4630	5760	2280	2250
Manganese	(ug/l)	120								35.1	119	64.3	4.7	114	[453]
Mercury	(ug/l)	1.3								0.00238J					0.0185
Nickel	(ug/l)	52													2.7J
Potassium	(ug/l)									3100	2630	4800	5350	1850	2000
Selenium	(ug/l)	5										0.67J	0.66J		0.58J
Silver	(ug/l)	0.36													
Sodium	(ug/l)									62300	51300	108000	145000	29800	25000
Vanadium	(ug/l)	20													5.3
Zinc	(ug/l)	120													
Cyanide	(ug/l)	5.2													
Pesticides/PCBs															

Table 4.4-1
Detected Concentrations in Surface Water

			BRIDGE	COUNTY_BRIDGE	FP	RMFD_RVR_DWNSTR	RRHP03-W	RRKP-W	RRUS-W	SW-001	SW-004	SW-005	SW-006	SW-007	SW-008
		Surface Water							RRUS-2W	D01893	D01894	D01895	D01896	D01897	D01898
		Screening	6/30/1998	6/30/1998	10/16/1998	6/30/1998	10/16/1998	10/16/1998	10/16/1998	11/6/2001	11/6/2001	11/6/2001	11/7/2001	11/7/2001	11/7/2001
CONSTITUENT	UNITS	Criteria	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary
gamma-BHC (Lindane)	(ug/l)	0.08			[0.082]										
Dieldrin	(ug/l)	0.056			0.013										
Endrin	(ug/l)	0.036			0.017										
4,4'-DDT	(ug/l)	0.013			[0.023]										
Dioxin															
2,3,7,8-TCDD	(ng/l)	0.01													
1,2,3,6,7,8-HxCDD	(ng/l)						0.0084J								
1,2,3,7,8,9-HxCDD	(ng/l)						0.0024*								
1,2,3,4,6,7,8-HpCDD	(ng/l)				0.045J		0.11J	0.046J						0.435J	
OCDD	(ng/l)				0.27J		0.33J	0.28J						3.64J	
2,3,7,8-TCDF	(ng/l)														
1,2,3,4,7,8-HxCDF	(ng/l)						0.0018*								
1,2,3,6,7,8-HxCDF	(ng/l)						0.0021*	0.0014*							
1,2,3,7,8,9-HxCDF	(ng/l)						0.00090*								
1,2,3,4,6,7,8-HpCDF	(ng/l)				0.0085J		0.031*	0.0097J						0.0689J	
1,2,3,4,7,8,9-HpCDF	(ng/l)						0.0035*								
OCDF	(ng/l)				0.030J		0.14J	0.038J						0.303J	
TCDDs (total)	(ng/l)														
PeCDDs (total)	(ng/l)							0.00036							
HpCDDs (total)	(ng/l)				0.045		0.16	0.046						0.668J	
TCDFs (total)	(ng/l)														
HxCDFs (total)	(ng/l)				0.0049		0.045	0.0099	0.0005						
HpCDFs (total)	(ng/l)				0.032		0.12	0.036						0.295J	
TEQ EMPC (ND=0) 1989	(ng/l)	0.01			0.00083J		0.0035J	0.0010J						0.009J	
TEQ EMPC (ND=0) 1998	(ng/l)	0.01			0.00057J		0.0030J	0.00073J						0.0090J	

Table 4.4-1
Detected Concentrations in Surface Water

			SW-009	SW-010	SW-010	SW-013	SW-013	SW-014	SW-015	SW-015	SW-015	SW-015	SW-015	SW-015	SW-015	SW-015
		Surface Water	D01899	D01900	D01901	D01902	D01994	D01903	A10W1	D04236	MA10W1	A10W3	D04238	MA10W3	A10X0	D04245
		Screening	11/8/2001	11/8/2001	11/8/2001	11/9/2001	11/9/2001	11/9/2001	10/21/2003	10/21/2003	10/21/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003
CONSTITUENT	UNITS	Criteria	Primary	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Duplicate 1
VOCs																
1,1,2-Trichloroethane	(ug/l)	1200														
SVOCs																
Benzaldehyde	(ug/l)															
4-Methylphenol	(ug/l)															
Isophorone	(ug/l)															
2,4-Dichlorophenol	(ug/l)	365														
Naphthalene	(ug/l)	12														
2,4,6-Trichlorophenol	(ug/l)	970														
2,4,5-Trichlorophenol	(ug/l)	63														
2,6-Dinitrotoluene	(ug/l)		7J													
Fluorene	(ug/l)	3.9							0.0098J			0.062			0.068	
4,6-Dinitro-2-methylphenol	(ug/l)		0.69J													
Atrazine	(ug/l)															
Pentachlorophenol	(ug/l)	15	[19]	0.012J	0.007J	0.005J			9J			6J			11J	
Phenanthrene	(ug/l)	6.3							0.0096J			0.25			0.27	
Anthracene	(ug/l)	0.73										0.036			0.034	
Carbazole	(ug/l)					0.33J										
Di-n-butylphthalate	(ug/l)	35			0.44J	0.46J		0.32J								
Fluoranthene	(ug/l)	6.16				0.45J						0.13			0.14	
Pyrene	(ug/l)					0.72J										
Butylbenzylphthalate	(ug/l)	19			0.61J	1.2J		0.36J								
Benzo(a)anthracene	(ug/l)	0.027			[0.25]J	0.023J						0.019			0.02	
Chrysene	(ug/l)				0.28J	0.036J		0.006J								
bis(2-Ethylhexyl) phthalate	(ug/l)	3							[3]J							
Di-n-octylphthalate	(ug/l)				0.74J	1J		0.26J								
Benzo(b)fluoranthene	(ug/l)					0.029J										
Benzo(k)fluoranthene	(ug/l)					0.031J										
Benzo(a)pyrene	(ug/l)	0.014				[0.019]J						0.0066J			0.0076J	
Indeno(1,2,3-cd)pyrene	(ug/l)					0.025J		0.0056J								
Dibenzo(a,h)anthracene	(ug/l)					0.0067J										
Benzo(g,h,i)perylene	(ug/l)					0.27J										
2,3,5,6-Tetrachlorophenol	(ug/l)															
3,4-Dimethylphenol	(ug/l)															
Metals/Cyanide																
Aluminum	(ug/l)	87	12.5J	14.5J	16.9	[155]		36								
Antimony	(ug/l)	30	0.29J	0.28J	0.28J	0.67										
Arsenic	(ug/l)	150	1.5J	0.38	0.37	0.64		0.31								
Barium	(ug/l)	4	[15.7]	[15.3]	[15.7]	[20.2]		[19.8]	[24.5]			[24.4]			[24.7]	
Beryllium	(ug/l)	0.66														
Cadmium	(ug/l)	0.25				0.06J										
Calcium	(ug/l)		11300	11200	11200	11500		10400	11700			12200			12400	
Chromium(total)	(ug/l)	74														
Cobalt	(ug/l)	23														
Copper	(ug/l)	9	1J	1J		2.6										
Iron	(ug/l)	1000	161J	292	288	[1070]		288	374			414			416	
Lead	(ug/l)	2.5	0.12J	0.2J	0.21	2.3		0.65								
Magnesium	(ug/l)		2270	2250	2250	2280		2140	2370			2470			2510	
Manganese	(ug/l)	120	86.5J	79	82	[246]		[175]	[166]			[183]			[186]	
Mercury	(ug/l)	1.3				0.0142	0.0188	0.0043J								
Nickel	(ug/l)	52														
Potassium	(ug/l)		1800	1750	1800	1830		1830	2340			2400			2450	
Selenium	(ug/l)	5														
Silver	(ug/l)	0.36				0.16J										
Sodium	(ug/l)		30400	29400	29800	31900		22400	39600			40700			41200	
Vanadium	(ug/l)	20														
Zinc	(ug/l)	120							4.7			3.8			4.4	
Cyanide	(ug/l)	5.2						[9.2]J								
Pesticides/PCBs																

Table 4.4-1

Detected Concentrations in Surface Water

			SW-009	SW-010	SW-010	SW-013	SW-013	SW-014	SW-015	SW-015	SW-015	SW-015	SW-015	SW-015	SW-015	SW-015
		Surface Water	D01899	D01900	D01901	D01902	D01994	D01903	A10W1	D04236	MA10W1	A10W3	D04238	MA10W3	A10X0	D04245
		Screening	11/8/2001	11/8/2001	11/8/2001	11/9/2001	11/9/2001	11/9/2001	10/21/2003	10/21/2003	10/21/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003	10/23/2003
CONSTITUENT	UNITS	Criteria	Primary	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Duplicate 1
gamma-BHC (Lindane)	(ug/l)	0.08														
Dieldrin	(ug/l)	0.056														
Endrin	(ug/l)	0.036														
4,4'-DDT	(ug/l)	0.013														
Dioxin																
2,3,7,8-TCDD	(ng/l)	0.01		0.0024*	0.0025*											
1,2,3,6,7,8-HxCDD	(ng/l)															
1,2,3,7,8,9-HxCDD	(ng/l)															
1,2,3,4,6,7,8-HpCDD	(ng/l)															
OCDD	(ng/l)															
2,3,7,8-TCDF	(ng/l)			0.0013J	0.0016J											
1,2,3,4,7,8-HxCDF	(ng/l)															
1,2,3,6,7,8-HxCDF	(ng/l)															
1,2,3,7,8,9-HxCDF	(ng/l)															
1,2,3,4,6,7,8-HpCDF	(ng/l)															
1,2,3,4,7,8,9-HpCDF	(ng/l)															
OCDF	(ng/l)															
TCDDs (total)	(ng/l)			0.0024*	0.0025*											
PeCDDs (total)	(ng/l)															
HpCDDs (total)	(ng/l)															
TCDFs (total)	(ng/l)			0.0013J	0.0016J											
HxCDFs (total)	(ng/l)															
HpCDFs (total)	(ng/l)															
TEQ EMPC (ND=0) 1989	(ng/l)	0.01		0.0025J	0.0027J											
TEQ EMPC (ND=0) 1998	(ng/l)	0.01		0.0025J	0.0027J											

Table 4.4-1
Detected Concentrations in Surface Water

			SW-015	SW-015	SW-015	SW-016	SW-016	SW-016	SW-016	SW-016	SW-1	SW-2	SW-3	VP-001	VP-001	VP-002
		Surface Water	MA10X0	D04240	MA10W5	MA10W2	A10W4	MA10W4	D04241	MA10W6	SW-1	SW-2	SW-3	D02520	D02521	D02522
		Screening	10/23/2003	10/27/2003	10/27/2003	10/21/2003	10/23/2003	10/23/2003	10/27/2003	10/27/2003	4/4/1989	4/4/1989	4/4/1989	4/25/2002	4/25/2002	4/25/2002
CONSTITUENT	UNITS	Criteria	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary
VOCs																
1,1,2-Trichloroethane	(ug/l)	1200														
SVOCs																
Benzaldehyde	(ug/l)													0.74J	0.45J	0.44J
4-Methylphenol	(ug/l)															1.2J
Isophorone	(ug/l)															
2,4-Dichlorophenol	(ug/l)	365														0.86J
Naphthalene	(ug/l)	12														6J
2,4,6-Trichlorophenol	(ug/l)	970														0.42J
2,4,5-Trichlorophenol	(ug/l)	63														9.4J
2,6-Dinitrotoluene	(ug/l)															
Fluorene	(ug/l)	3.9		0.0084J												
4,6-Dinitro-2-methylphenol	(ug/l)															
Atrazine	(ug/l)															
Pentachlorophenol	(ug/l)	15									[34.7]	[39.3]	6.82			[680]
Phenanthrene	(ug/l)	6.3		0.2					0.0062J							
Anthracene	(ug/l)	0.73		0.1												
Carbazole	(ug/l)															
Di-n-butylphthalate	(ug/l)	35														
Fluoranthene	(ug/l)	6.16		0.0070J					0.0074J							
Pyrene	(ug/l)															0.28J
Butylbenzylphthalate	(ug/l)	19													0.26J	
Benzo(a)anthracene	(ug/l)	0.027														
Chrysene	(ug/l)															
bis(2-Ethylhexyl) phthalate	(ug/l)	3					[3]J							0.64J	0.91J	
Di-n-octylphthalate	(ug/l)															
Benzo(b)fluoranthene	(ug/l)															0.25J
Benzo(k)fluoranthene	(ug/l)															
Benzo(a)pyrene	(ug/l)	0.014		[0.12]												
Indeno(1,2,3-cd)pyrene	(ug/l)															
Dibenzo(a,h)anthracene	(ug/l)															
Benzo(g,h,i)perylene	(ug/l)															
2,3,5,6-Tetrachlorophenol	(ug/l)															12J
3,4-Dimethylphenol	(ug/l)															0.77J
Metals/Cyanide																
Aluminum	(ug/l)	87												[1270]J	[510]J	[807]J
Antimony	(ug/l)	30												0.57	0.37J	0.32J
Arsenic	(ug/l)	150												1.2J	0.76J	0.55J
Barium	(ug/l)	4		[27.2]		[28.3]	[27.4]		[27.7]					[26.6]J	[12.6]J	[18.8]J
Beryllium	(ug/l)	0.66												[0.73]J	0.29J	0.32J
Cadmium	(ug/l)	0.25												[0.34]	0.07J	[0.72]
Calcium	(ug/l)			11700		12100	12200		11200					8700	6670	12500
Chromium(total)	(ug/l)	74														3.8J
Cobalt	(ug/l)	23												2.5	1.6J	4.3
Copper	(ug/l)	9		1.9J					1.4J					6.7	2.7	8.3
Iron	(ug/l)	1000		547		419	477		481					[1520]	[2010]	[21200]
Lead	(ug/l)	2.5				[3.4]J								[11.3]J	1.9J	[8.6]J
Magnesium	(ug/l)			2350		2440	2480		2200					1330	1200	2360
Manganese	(ug/l)	120		[285]		[258]	[320]		[327]					15.6J	10.7J	[882]J
Mercury	(ug/l)	1.3												0.017J	0.074J	0.018J
Nickel	(ug/l)	52												5J	3.4J	2.8J
Potassium	(ug/l)			2860		2360	2370		2590					339J	188J	840J
Selenium	(ug/l)	5												0.86J	0.62J	0.78J
Silver	(ug/l)	0.36														
Sodium	(ug/l)			38400		42700	43000		37600					5220	5150	11000
Vanadium	(ug/l)	20												9.3	3.3J	4J
Zinc	(ug/l)	120		7.7		9.9	3.5		6.7					44.5	14.6	18.7
Cyanide	(ug/l)	5.2														
Pesticides/PCBs																

Table 4.4-1

Detected Concentrations in Surface Water

			SW-015	SW-015	SW-015	SW-016	SW-016	SW-016	SW-016	SW-016	SW-1	SW-2	SW-3	VP-001	VP-001	VP-002
		Surface Water	MA10X0	D04240	MA10W5	MA10W2	A10W4	MA10W4	D04241	MA10W6	SW-1	SW-2	SW-3	D02520	D02521	D02522
		Screening	10/23/2003	10/27/2003	10/27/2003	10/21/2003	10/23/2003	10/23/2003	10/27/2003	10/27/2003	4/4/1989	4/4/1989	4/4/1989	4/25/2002	4/25/2002	4/25/2002
CONSTITUENT	UNITS	Criteria	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary
gamma-BHC (Lindane)	(ug/l)	0.08														
Dieldrin	(ug/l)	0.056														
Endrin	(ug/l)	0.036														
4,4'-DDT	(ug/l)	0.013														
Dioxin																
2,3,7,8-TCDD	(ng/l)	0.01														
1,2,3,6,7,8-HxCDD	(ng/l)															
1,2,3,7,8,9-HxCDD	(ng/l)															
1,2,3,4,6,7,8-HpCDD	(ng/l)															
OCDD	(ng/l)															
2,3,7,8-TCDF	(ng/l)															
1,2,3,4,7,8-HxCDF	(ng/l)															
1,2,3,6,7,8-HxCDF	(ng/l)															
1,2,3,7,8,9-HxCDF	(ng/l)															
1,2,3,4,6,7,8-HpCDF	(ng/l)															
1,2,3,4,7,8,9-HpCDF	(ng/l)															
OCDF	(ng/l)															
TCDDs (total)	(ng/l)															
PeCDDs (total)	(ng/l)															
HpCDDs (total)	(ng/l)															
TCDFs (total)	(ng/l)															
HxCDFs (total)	(ng/l)															
HpCDFs (total)	(ng/l)															
TEQ EMPC (ND=0) 1989	(ng/l)	0.01														
TEQ EMPC (ND=0) 1998	(ng/l)	0.01														

Table 4.5-1: Cone Penetrometer Investigation Summary, November 2002

Sounding Identification	Total Depth (Feet)	Impacted Depth (Feet)	Level of Impact LFFD	Level of Impact HFFD	Observation from Video-CPT
CPT-A3	19.93	7 - 9	25 mV	20 mV	No apparent LNAPL impacts.
CPT-A4	14.68	7.5 - 9.5	20 mv	15 mV	Sparse LNAPL observed at 8.9 through 9.6 feet.
CPT-A5	5.79	ND	<10 mV	<10 mV	
CPT-A6	5.08	ND	<10 mV	<10 mV	
CPT-A7	3.27	ND	<10 mV	<10 mV	
CPT-A8	5.77	ND	<10 mV	<10 mV	
CPT-A10	4.83	ND	<10 mV	<10 mV	
CPT-A11	5.33	ND	<10 mV	<10 mV	
CPT-B1	20.62	7 - 9	<10 mV	18 mV	
CPT-B2	17.43	6 - 8	12 mV	30 mV	
CPT-C1	19.33	6 - 8	20 mV	55 mV	
CPT-C3	5.18	ND	<10 mV	<10 mV	
CPT-C4	7.28	ND	<10 mV	<10 mV	
CPT-D1	23.21	7.5 - 11	<10 mV	20 mV	
CPT-D2	22.22	7.5 - 10.5	15 mV	35 mV	
CPT-D3	19.54	7.5 - 9	15 mV	58 mV	
CPT-D4	19.84	7.5 - 11	25 mV	100 mV	Sparse LNAPL observed from 7.3 through 7.4 feet. Heavier through 7.9 feet. Sparse LNAPL at 9.8 feet.
CPT-D5	10.18	6.5 - 8	<10 mV	35 mV	LNAPL observed from 10.2 through 10.7 feet.
CPT-D6	8.02	3 - 6	15 mV	40 mV	
CPT-D8	4.94	ND	<10 mV	<10 mV	
CPT-D9	5.16	ND	<10 mV	<10 mV	
CPT-D10	5.79	1 - 4	<10 mV	30 mV	
CPT-E1	25.07	7 - 9	15 mV	<10 mV	
CPT-E2	30.34	6 - 10	20 mV	70 mV	
CPT-E3	16.46	7 - 9	20 mV	90 mV	Sparse LNAPL observed at 7.0 through 7.8 feet.
CPT-E4	19.72	6 - 10	20 mV	80 mV	LNAPL observed from 7.0 through 9.7 feet.
CPT-E6	5.1	ND	<10 mV	<10 mV	
CPT-6A	1.28	ND	<10 mV	<10 mV	
CPT-E7	7.59	ND	<10 mV	<10 mV	
CPT-E8	4.6	1 - 3	100 mV	<10 mV	
CPT-F1	23.11	8 - 11	<10 mV	20 mV	
CPT-F4	19.02	4 - 7	<10 mV	45 mV	
CPT-G1	16.44	7 - 10	15 mV	70 mV	
CPT-G3	16.24	5 - 7	15 mV	60 mV	
CPT-H1	16.6	8 - 9	20 mV	50 mV	No apparent LNAPL impacts.
CPT-I1	2.15	ND	<10 mV	<10 mV	
CPT-J1	3.73	ND	<10 mV	<10 mV	

Note: ND = Not Detected, mV = Millivolts, CPT = Cone Penetrometer Test

Table 4.6-1
Detected Concentrations in Fish Tissue

			BP-LMB	BP-WS	BP-YP	FP-WS	FP-YP	KP-LMB	KP-LMB	RR-SITE-CRAY	RR-SITE-PICK	RR-SITE-WS	RR-UP-CRAY	RR-UP-PICK	RR-UP-WS
		Fish Tissue	D04251	D04252	D04253	D04254	D04255	D04256	D04257	D04263	D04262	D04261	D04260	D04259	D04258
		Screening	9/25/2003	9/25/2003	9/25/2003	9/25/2003	9/25/2003	9/25/2003	9/25/2003	10/16/2003	10/16/2003	10/16/2003	10/16/2003	10/16/2003	10/16/2003
CONSTITUENT	UNITS	Level	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary
SVOCs															
Naphthalene	(ug/kg)	22		3.6J		4.1J									
2-Methylnaphthalene	(ug/kg)	22		2.4J		4.4J	2J			1.9J	1.3J				
Acenaphthylene	(ug/kg)	22		0.58J		0.54J				0.52J	0.63J		0.43J		0.39J
Acenaphthene	(ug/kg)	210	0.099J	0.68J	0.11J	0.43J	0.16J			0.76J	1.1J	0.43J	0.31J	1J	0.87J
2,3,5,6-Tetrachlorophenol	(ug/kg)	5.2										[180]J			
Fluorene	(ug/kg)	540		1.2J		0.73J				0.88J	1.4J	0.65J		1.1J	1.2J
Pentachlorophenol	(ug/kg)	5.2				[1000]	[960]	[240]J	[160]J		[3100]	[7400]			
Phenanthrene	(ug/kg)	210		2.8J						3.3J	3.1J		3J		
Anthracene	(ug/kg)	22									0.64J				
Fluoranthene	(ug/kg)	22		1.2J						4.8J	3.6J	3J	5.9J	1.7J	1.3J
Pyrene	(ug/kg)	22								3.6J	2.7J	2.5J	5.1J	1.1J	
Benzo(a)anthracene	(ug/kg)	4.3								1.1J	1.1J	1J	1.3J		
Chrysene	(ug/kg)	22								2J	2.1J	1.6J	3J		
Benzo(b)fluoranthene	(ug/kg)	22								1.1J	1.7J	1.5J	1.6J		
Benzo(k)fluoranthene	(ug/kg)	22								1.2J	1.4J	1.2J	1.7J		
Benzo(a)pyrene	(ug/kg)	0.43								[0.82]J	[0.84]J	[1]J	[1.4]J		
Indeno(1,2,3-cd)pyrene	(ug/kg)	4.3										1.2J	1.2J		
Benzo(g,h,i)perylene	(ug/kg)	22										1.1J	1.5J		
Total PAHs	(ug/kg)		0.099J	12J	0.11J	10J	2.2J			22J	22J	15J	26J	4.9J	3.8J
Metals															
Aluminum	(ug/kg)	800								[12000]J	[2680]J	[4180]J	[16900]J	[5120]J	[3260]J
Antimony	(ug/kg)	52											[90.6]		
Arsenic	(ug/kg)	2	[11.7]			[40.4]	[15.3]		[10.1]	[458]J	[130]J	[35.1]J	[260]J	[67.3]J	[37]J
Barium	(ug/kg)	41	[51.9]	[113]	[231]	[152]	[203]	[90.8]		[63000]J	[8370]J	[1800]J	[56200]J	[3030]J	[2020]J
Cadmium	(ug/kg)	4								[123]J	[84.7]J	[65.8]	[60.9]J	[24.6]J	[34]J
Chromium(total)	(ug/kg)	20	[179]J	[55]J	[187]J	14.9J	[309]J	[156]J	[61.2]J	[131]J	[211]J	[177]J	[282]J	[215]J	[216]J
Cobalt	(ug/kg)	4000	9.7				10.3			195	61.4	49.1	273	63.5	66.3
Copper	(ug/kg)	500	162J	289J	133J	245J	171J	166J	162J	[22500]	[1010]	[728]	[19900]	[815]	[1080]
Iron	(ug/kg)									287000	42300	30300	517000	49700	56300
Lead	(ug/kg)	0.8					[11.5]			[309]J	[316]J	[93.6]	[375]J	[238]J	[66.1]J
Manganese	(ug/kg)	2000	175J	177J	[2640]J	611J	[2630]J	285J	203J	[168000]J	[43200]J	[27700]J	[246000]J	[35700]J	[32600]J
Nickel	(ug/kg)	42	[54.9]J	19.5J	[101]J	21.1J	[124]J	[119]J	34.7J	[2010]J	[1020]J	[676]J	[1960]J	[594]J	[555]J
Selenium	(ug/kg)	58	[189]	[165]	[189]	[207]	[267]	[180]	[156]	[172]J	[355]J	[392]	[112]J	[344]J	[338]J
Silver	(ug/kg)	370								[482]	28.6	16.1	[711]	45.9	64.8
Vanadium	(ug/kg)	210								[317]J	129J	57.4	[235]J	86.8J	46.7J
Zinc	(ug/kg)	300	[6590]	[9520]	[7070]	[7570]	[10600]	[8950]	[7290]	[15600]	[51000]	[20300]	[15900]	[52800]	[16500]
Dioxin															
2,3,7,8-TCDD	(ng/kg)	0.11												[1.67]	
1,2,3,6,7,8-HxCDD	(ng/kg)	1.1								[14.3]	[17.9]J				
1,2,3,4,6,7,8-HpCDD	(ng/kg)	11								[130]J	[42]J	10J	4.95J		
OCDD	(ng/kg)	110					54.1J			[2010]J	[842]J	[310]J	44.9J		
2,3,7,8-TCDF	(ng/kg)	1.1									[1.91]J			[3.25]	
1,2,3,7,8-PeCDF	(ng/kg)	2.2			0.0578*		0.045*			0.941*	0.656*				
1,2,3,4,7,8-HxCDF	(ng/kg)	1.1								[6.5]					
1,2,3,4,6,7,8-HpCDF	(ng/kg)	11								[27.8]	6.38J				
OCDF	(ng/kg)	110								41.9					
TEQ EMPC (ND=0) 1989	(ng/kg)	0.11			0.0029J		0.056J			[5.8]J	[3.3]J	[0.41]J	0.094J	[2.0]J	
Lipids, Total	(%)		0.26	2.4	0.24	1.1	0.26	0.13	0.1	0.59	1.6	0.78	0.73	2.2	1.4

Table 4.7-1: Soil Background Concentrations	
Compound	***Background Concentration (mg/kg)***
Aluminum	41000
Antimony	0.12U
Arsenic	2.6J
Barium	35J
Beryllium	0.6J
Cadmium	0.79J
Calcium	640
Chromium	35J
Cobalt	82J
Copper	24J
Iron	18000
Lead	20J
Magnesium	13000
Manganese	150J
Mercury	0.043
Nickel	8.2J
Potassium	260
Selenium	1
Silver	0.13
Sodium	190U
Thallium	0.11J
Vanadium	19J
Zinc	40J

Table 4.8-1: Ground Water Background Concentrations	
Compound	***Background Concentration (ug/l)***
Aluminum	217
Antimony	ND
Arsenic	0.55
Barium	86
Beryllium	ND
Cadmium	0.2
Calcium	14500
Chromium	ND
Cobalt	2.4
Copper	ND
Iron	308
Lead	0.32
Magnesium	2410
Manganese	60.1
Nickel	3.3
Potassium	4100
Selenium	ND
Sodium	30800
Thallium	ND
Vanadium	ND
Zinc	15

Table 5.2-1: Fate and Transport Mechanisms

Contaminant Group	Solubility	Volatilization	Sorption	Hydrolysis	Photolysis	Oxidation/ Reduction	Bio-Accumulation	Bio-Transformation/ Biodegradation
Halogenated VOCs	*More Likely*	*Likely*	*Less Likely*	*Less Likely*	*Less Likely*	*Less Likely*	*Likely*	*More Likely*
Non-Halogenated VOCs	*More Likely*	*More Likely*	*Less Likely*	*Less Likely*	*Less Likely*	*Less Likely*	*Less Likely*	*Likely*
Acid SVOCs	*More Likely*	*Likely*	*Likely*	*Less Likely*	*Less Likely*	*More Likely*	*Likely*	*More Likely*
Base-Neutral SVOCs	*Likely*	*Likely*	*More Likely*	*Less Likely*	*Less Likely*	*Les Likely*	*More Likely*	*Likely*
Pesticides	*Likely*	*Less Likely*	*More Likely*	*Less Likely*	*Less Likely*	*Less Likely*	*Likely*	*Less Likely*
PCBs/Dioxin	*Less Likely*	*Less Likely*	*More Likely*	*Less Likely*	*Less Likely*	*Less Likely*	*More Likely*	*Less Likely*
Inorganics/Metals	*Less Likely*	*Less Likely*	*More Likely*	*Less Likely*	*Less Likely*	*Less Likely*	*Likely*	*Less Likely*

Table 6.1-1: Human Health Risk Assessment Summary							
Exposure Point	***Scenario/ Receptor***	***Exposure Media***	***RME or CT***	***Total Cancer Risks***	***Total Noncancer Risks***	***Media > 1E-04 or HI > 1***	***Major contributors to risk (> 1E-06, HI > 1)***
Process Area - Surface Soil	Current Adolescent Trespasser	sediment, surface water, surface soil	RME	**2E-04**	**2E+00**	surface soil	(C) - As (NC) - As
			CT	1E-05	3E-01		
Overburden	Future Young Child/Adult Off-Site Resident-Swimming Pool	groundwater	RME	**4E-04**	**6E+00**	groundwater	(C) - pentachlorophenol; dioxins; As (NC) - 2-methylnaphthalene; As
			CT	1E-06	5E-02		
Operations Area - Surface Soil	Future Town Worker	surface soil	RME	**3E-04**	2E+00	surface soil	(C) - dioxins; As
			CT	3E-05	4E-01		
Operations Area - Surface Soil	Future Adolescent Trespasser	sediment, surface water, surface soil	RME	**3E-04**	**3E+00**	surface soil	(C) - dioxins; As (NC) - As
			CT	5E-05	1E+00		
Operations Area - Surface Soil	Future Commercial Worker	surface soil, indoor air	RME	**1E-03**	**8E+00**	surface soil	(C) - benzo(a)pyrene; dioxins; As (NC) - As
			CT	**3E-04**	**4E+00**		
Operations Area - Subsurface Soil	Future Commercial Worker	subsurface soil, indoor air	RME	**3E-04**	2E+00	subsurface soil	(C) - benzo(a)pyrene; pentachlorophenol; dioxins; As
			CT	6E-05	9E-01		

Table 6.1-1: Human Health Risk Assessment Summary							
Exposure Point	***Scenario/ Receptor***	***Exposure Media***	***RME or CT***	***Total Cancer Risks***	***Total Noncancer Risks***	***Media > 1E-04 or HI > 1***	***Major contributors to risk (> 1E-06, HI > 1)***
Operations Area - Surface Soil	Future Utility Worker	surface soil, groundwater	RME	3E-05	**4E+00**	surface soil	(NC) - As
			CT	9E-06	1E+00		
Deep Groundwater	Future Young Child/Adult Off-Site Resident	groundwater	RME	**8E-03**	**5E+01**	groundwater	(C) - 2,4,6-trichlorophenol; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(a,h)anthracene; pentachlorophenol; As (NC) - 2,3,5,6-tetrachlorophenol; 2,4,6-trichlorophenol; pentachlorophenol; As; Mn, Tl
			CT	**3E-04**	**7E+00**		
Shallow Groundwater	FutureYoung Child/Adult Off-Site Resident	groundwater	RME	**7E-02**	**5E+02**	groundwater	(C) - trichloroethene; vinyl chloride; 2,4,6-trichlorophenol; benzo(a)anthracene; benzo(a)pyrene; pentachlorophenol; dioxins; As(NC) - 2,3,5,6-tetrachlorophenol; 2,4,6-trichlorophenol; 2-methylnaphthalene; dibenzofuran; pentachlorophenol; As; Cr; Mn
			CT	**2E-03**	**3E+01**		
Operations Area - Surface Soil	Future Young Child/Adult On-Site Resident	sediment, surface water, surface soil, indoor air	RME	**3E-03**	**4E+01**	sediment, surface soil	(C) - benzo(a)pyrene; pentachlorophenol; dioxins; As (NC) - As; Cr
			CT	**4E-04**	**2E+01**		
Operations Area - Subsurface Soil	Future Young Child/Adult On-Site Resident	sediment, surface water, subsurface soil, indoor air	RME	**6E-04**	**8E+00**	sediment, subsurface soil	(C) - benzo(a)pyrene; pentachlorophenol; dioxins; As (NC) - As
			CT	1E-04	**5E+00**		

Table 6.1-1: Human Health Risk Assessment Summary							
Exposure Point	***Scenario/ Receptor***	***Exposure Media***	***RME or CT***	***Total Cancer Risks***	***Total Noncancer Risks***	***Media > 1E-04 or HI > 1***	***Major contributors to risk (> 1E-06, HI > 1)***
SE/SW Quadrants - Surface Soil	Future Young Child/Adult On-Site Resident	sediment, surface water, surface soil, indoor air	RME	**3E-04**	**4E+00**	sediment, surface soil	(C) - benzo(a)pyrene; pentachlorophenol; dioxins; As (NC) - As
			CT	4E-05	2E+00		
SE/SW Quadrants - Subsurface Soil	Future Young Child/Adult On-Site Resident	sediment, surface water, subsurface soil	RME	**4E-04**	2E+00	sediment, subsurface soil	(C) - benzo(a)pyrene; pentachlorophenol; dioxins; As
			CT	6E-05	1E+00		

Notes

Bolded values exceed a cancer risk of 1E-04 or a target organ HI of 1.

Dermal exposures to benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, phenanthrene, pentachlorophenol, and dioxins in water cannot be quantified.

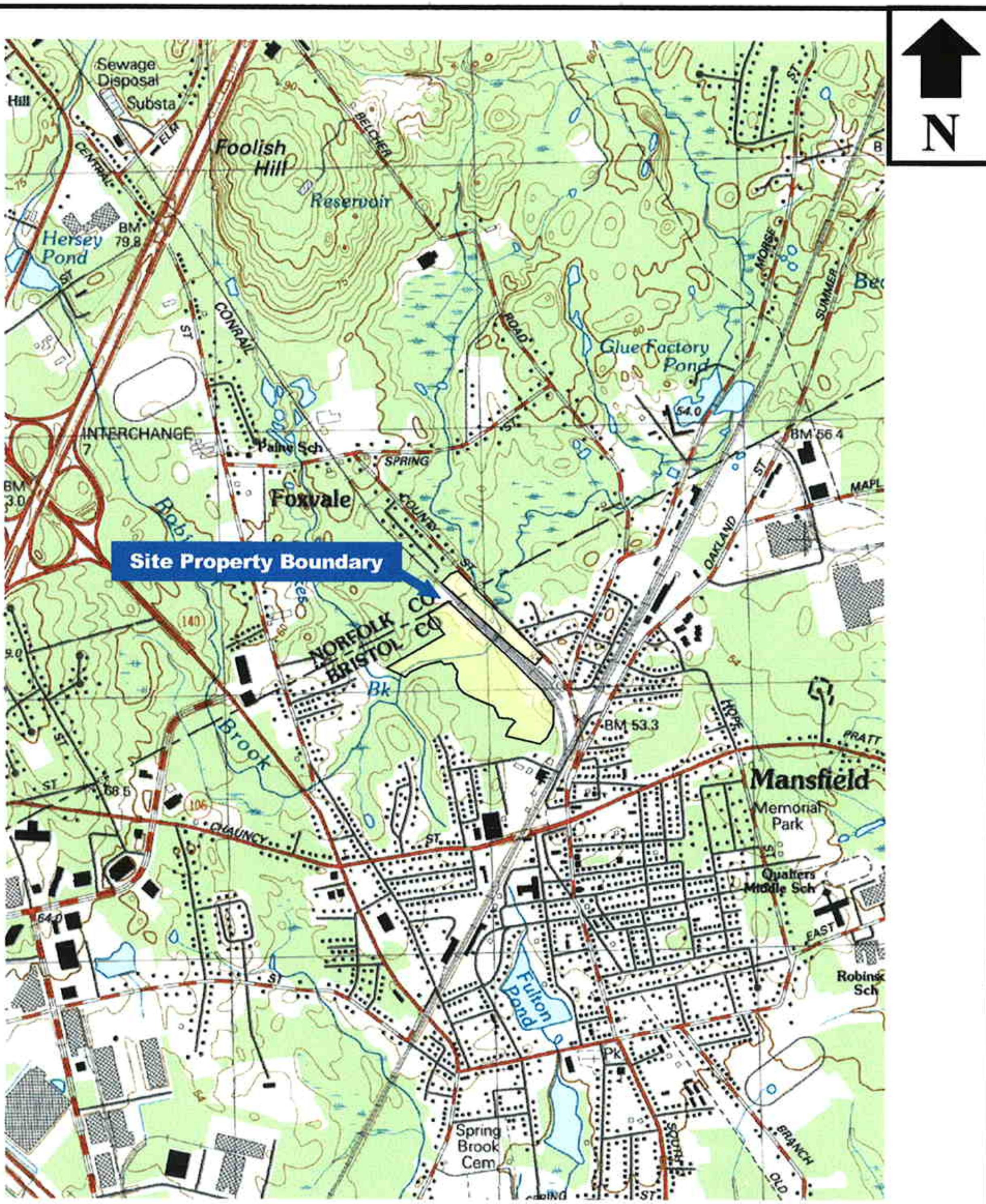
HI - Hazard Index
(C) - Carcinogenic Risk
RME - Reasonable Maximum Exposure
(NC) - Noncarcinogenic Risk
CT - Central Tendency Exposure
NE - Not Evaluated
As - Arsenic
N/A - Not Applicable
Mn - Manganese
Cr - Chromium
Tl - Thallium

Table 6.2-1: Ecological Risks Assessment Summary											
Target Receptor Group	***Measurement Endpoints (Lines of Evidence)***										***Integrated Risk Interpretation***
	Published Benchmarks		***Laboratory Toxicity Testing***		***Tissue Residue Analyses***		***Community Analysis***		***Food Chain Modeling***		
	WOE	Risk	WOE	Risk	WOE	Risk	WOE	Risk	WOE	Risk	
benthic macro-invertebrate community	L-M	no risk to high risk[a]	H	no risk	M-H	no risk	H	no risk	--	ND	no significant risk expected
water column invertebrate community	L-M	high risk	M-H	no risk	--	ND	--	ND	--	ND	no significant risk expected
fish community	L-M	high risk	M-H	no risk	M-H	mini-mal risk	--	ND	--	ND	no significant risk expected
piscivorous birds	--	ND	--	ND	--	ND	--	ND	M-H	no risk	no significant risk expected
piscivorous mammals	--	ND	--	ND	--	ND	--	ND	M-H	mini-mal risk	no significant risk expected

[a] for this measurement endpoint, risk to the benthic macroinvertebrate community was assessed based on analytical data from individual sediment samples

WOE = weight of evidence
L-M = low-medium
M-H = medium-high
H = high
ND = not determined

Figures



BASE MAP IS A PORTION OF THE FOLLOWING 7.5' x 15' USGS TOPOGRAPHIC QUADRANGLE: BROCKTON, MA. 1987

0 1000 2000

Scale in Feet

FIGURE 1.2-1
SITE LOCATION MAP

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI REPORT/TOPO

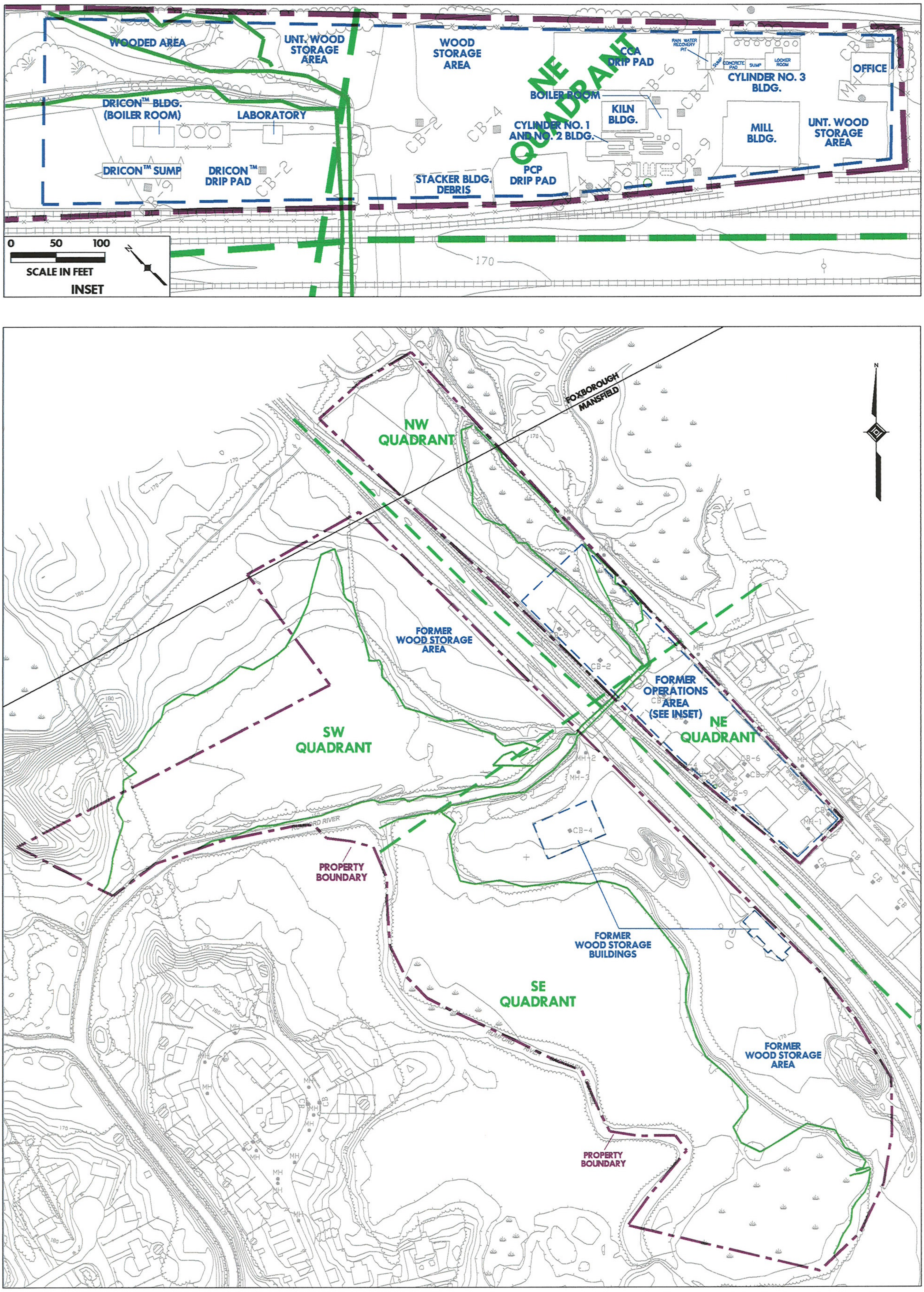


FIGURE 1.2-2

SITE LAYOUT

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACTOR: 107061

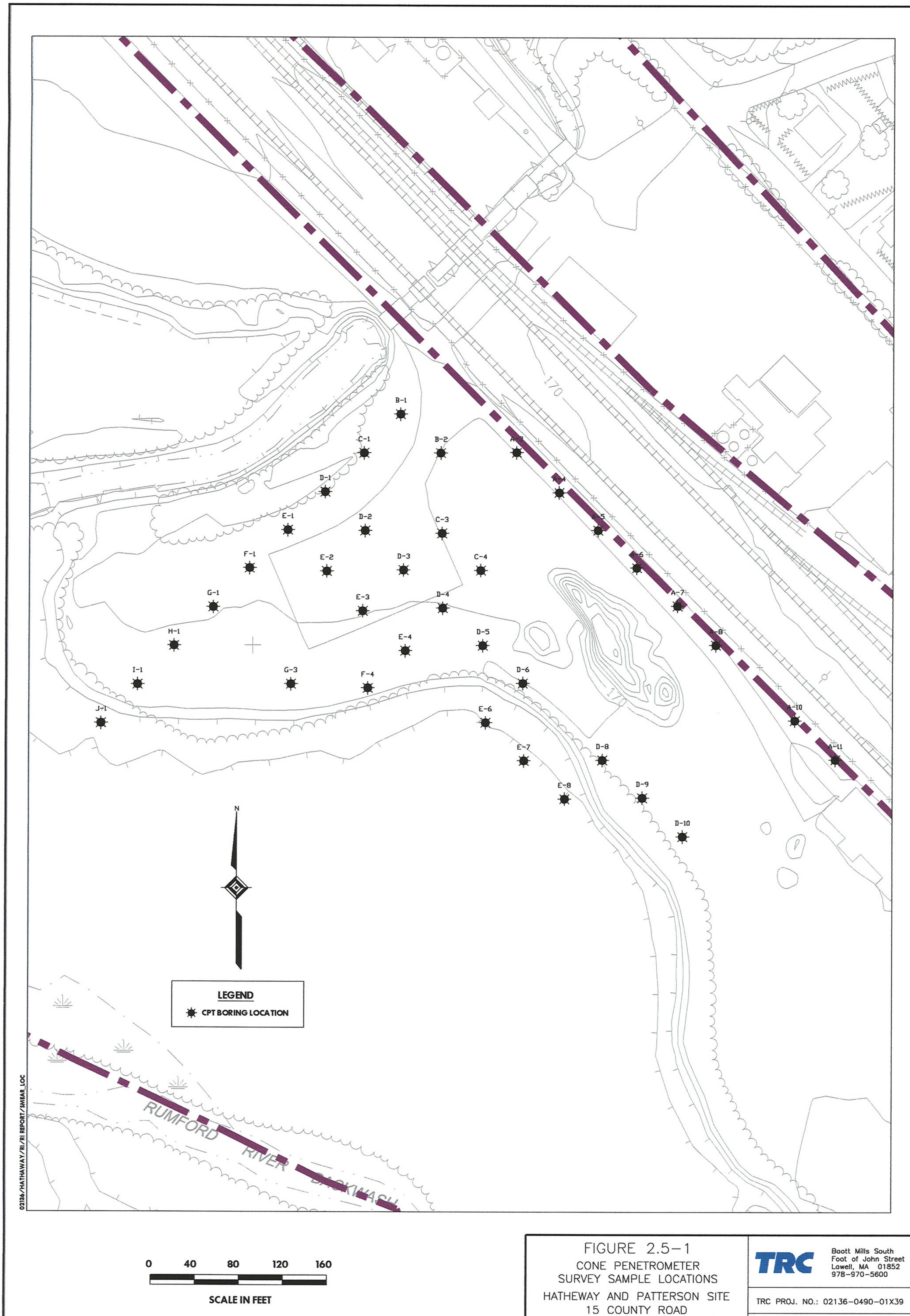


FIGURE 2.5–1
CONE PENETROMETER SURVEY SAMPLE LOCATIONS

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

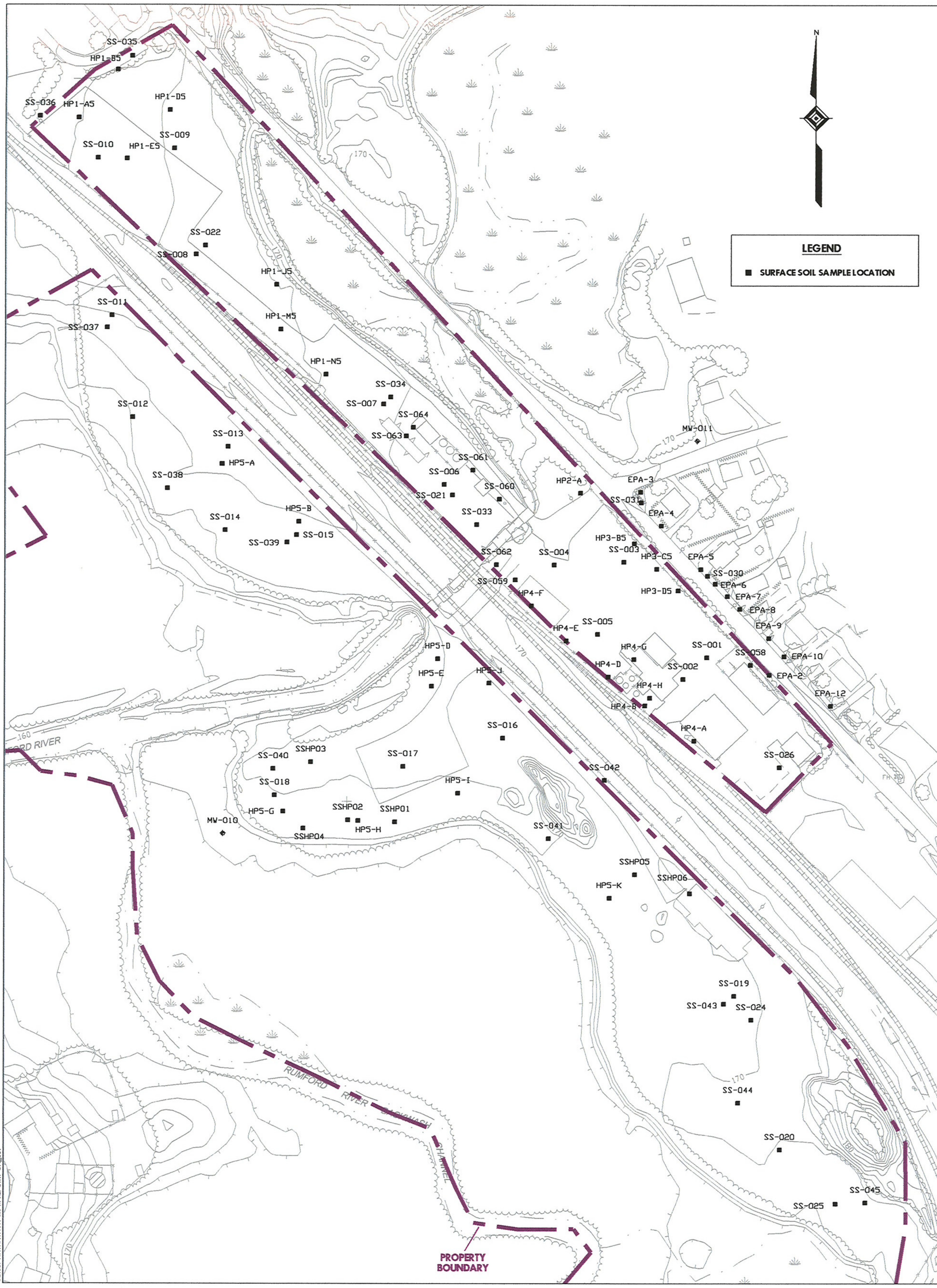
M&E Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



0 75 150 225 300

SCALE IN FEET

FIGURE 2.6-1

ON-SITE SURFACE SOIL SAMPLE LOCATIONS

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

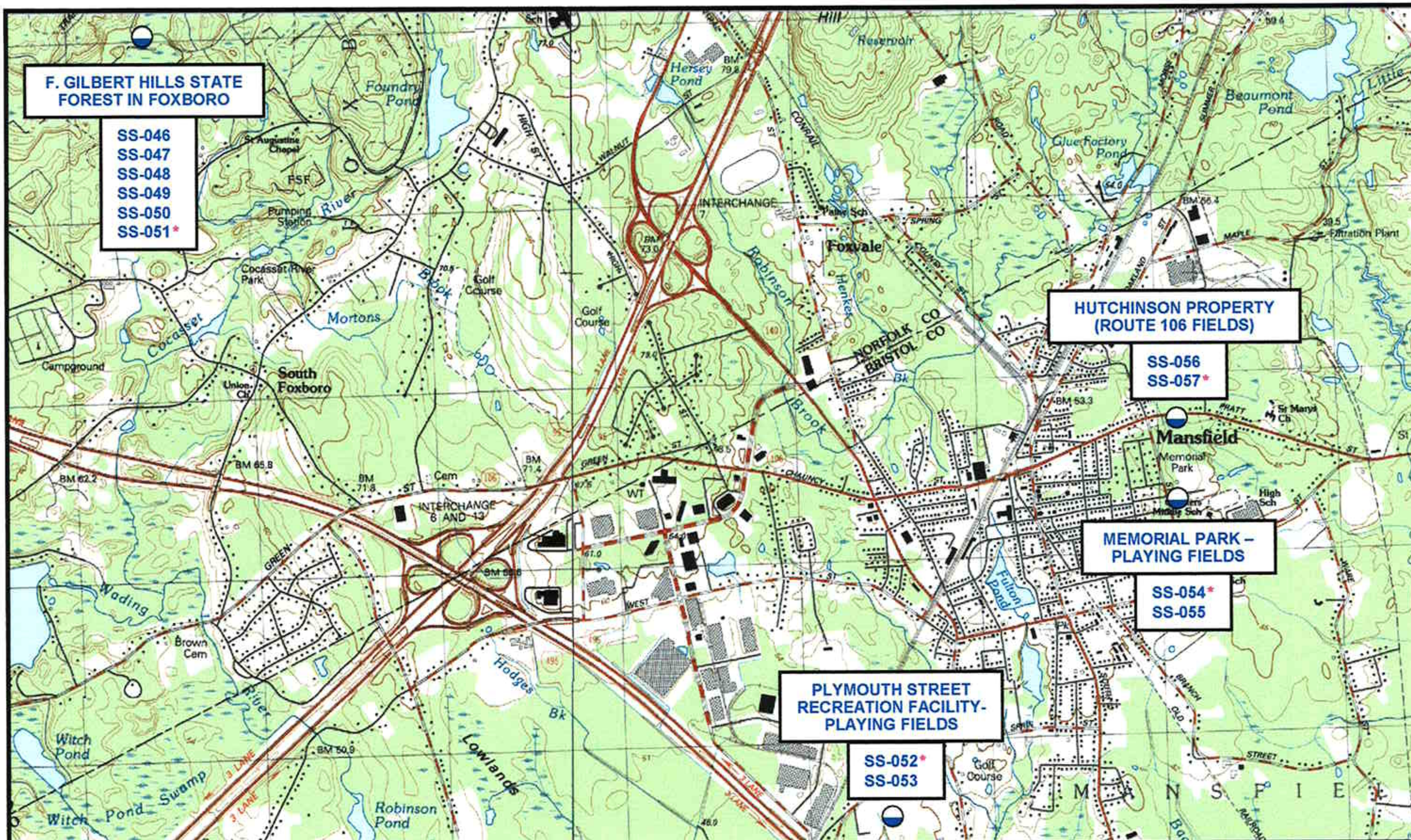
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



BASE MAP IS A PORTION OF THE FOLLOWING 7.5' x 15' USGS TOPOGRAPHIC QUADRANGLES: FRANKLIN, MA, 1987; BROCKTON, MA, 1987

LEGEND

- Location of Arsenic Background Locations
- * Indicates Sample Submitted for Laboratory Analysis

0 1500 3000

Scale in Feet

FIGURE 2.6-2
OFF-SITE SURFACE SOIL SAMPLE LOCATIONS
HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.: 02136-0310-01X31

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/BACKGROUND

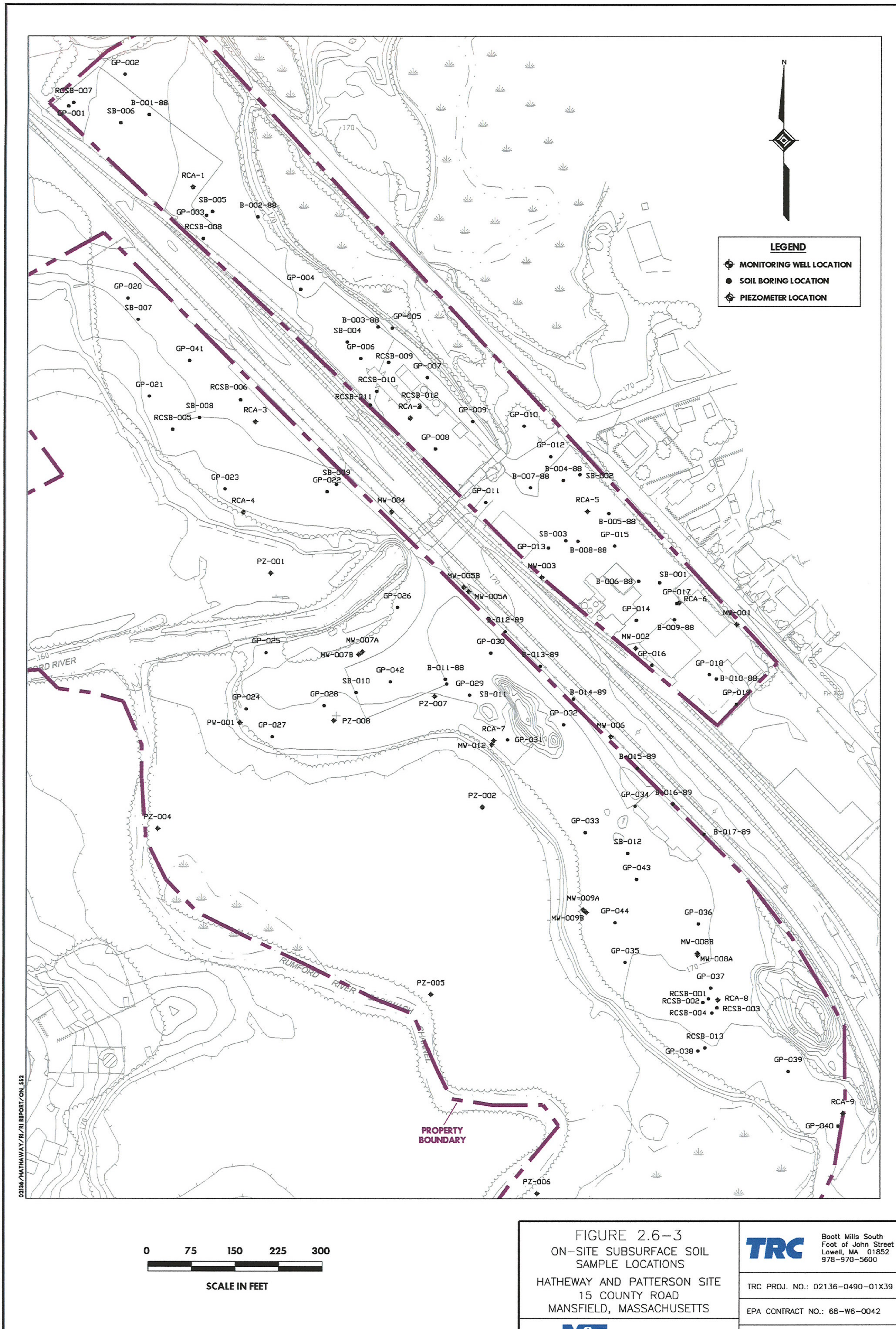


FIGURE 2.6–3
ON–SITE SUBSURFACE SOIL SAMPLE LOCATIONS

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

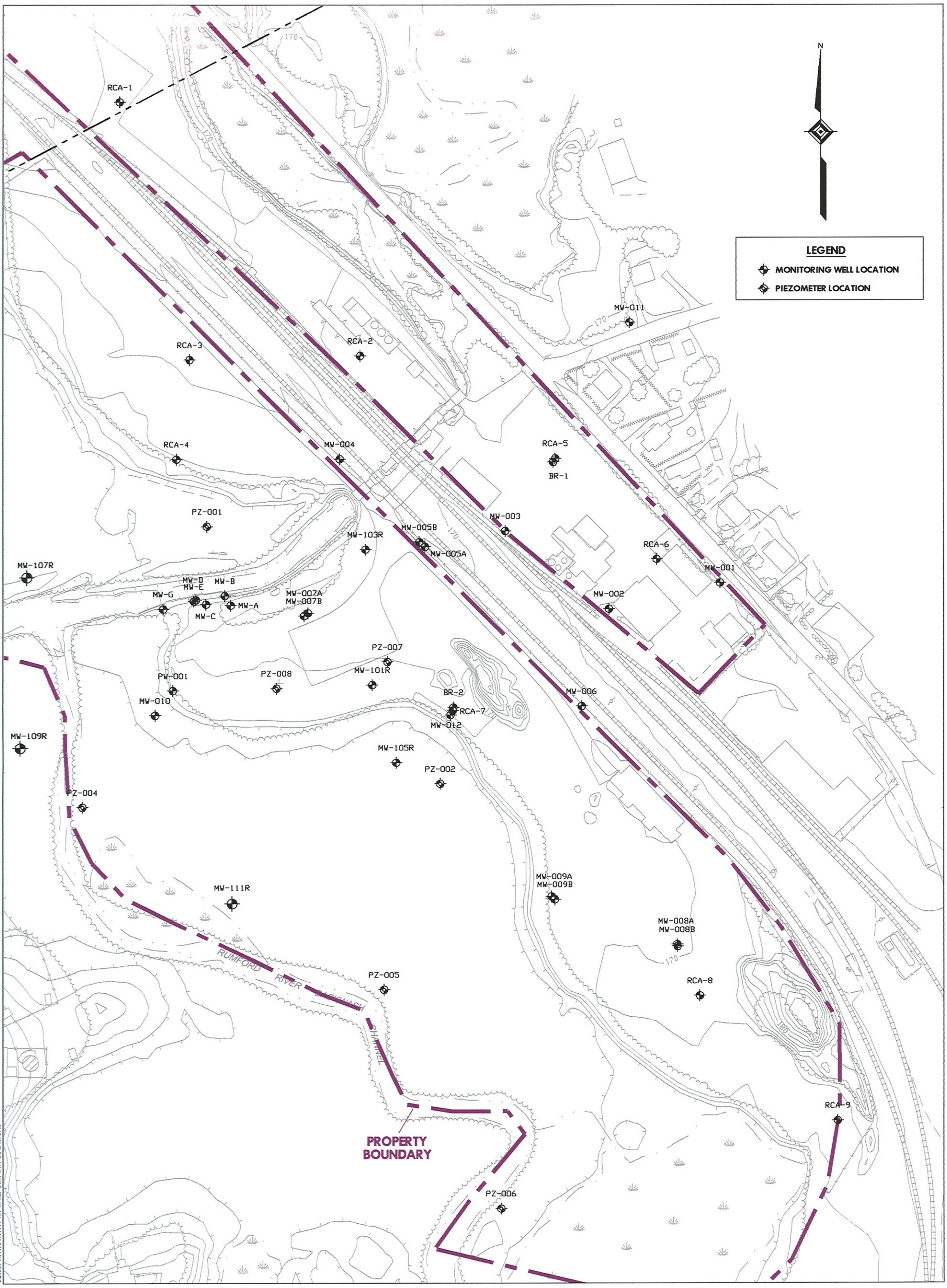
Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



0 75 150 225 300

SCALE IN FEET

FIGURE 2.7–1

MONITORING WELL LOCATIONS

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

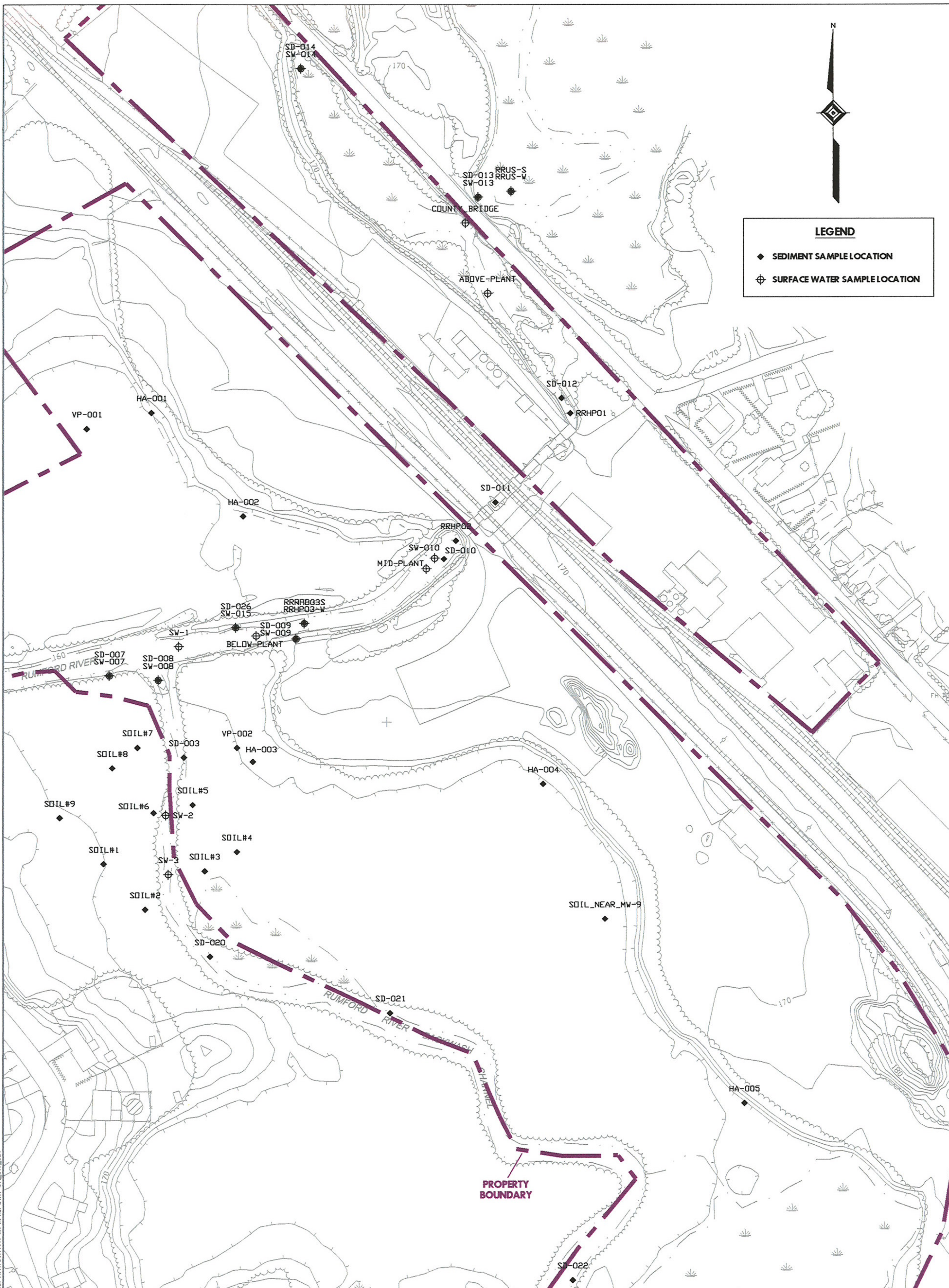
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



0 75 150 225 300

SCALE IN FEET

FIGURE 2.8-1

ON-SITE SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

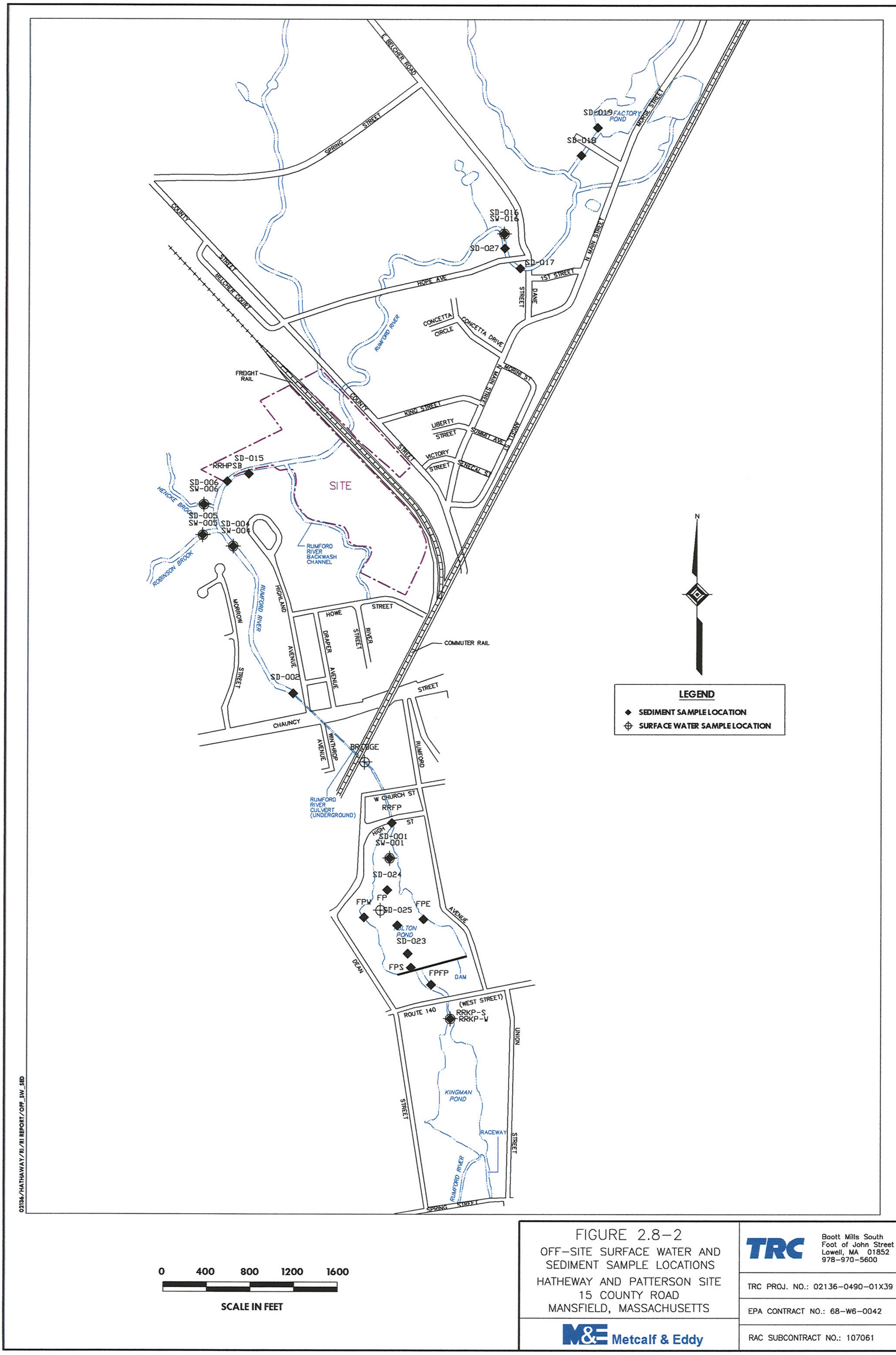


FIGURE 2.8–2
OFF–SITE SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS
HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

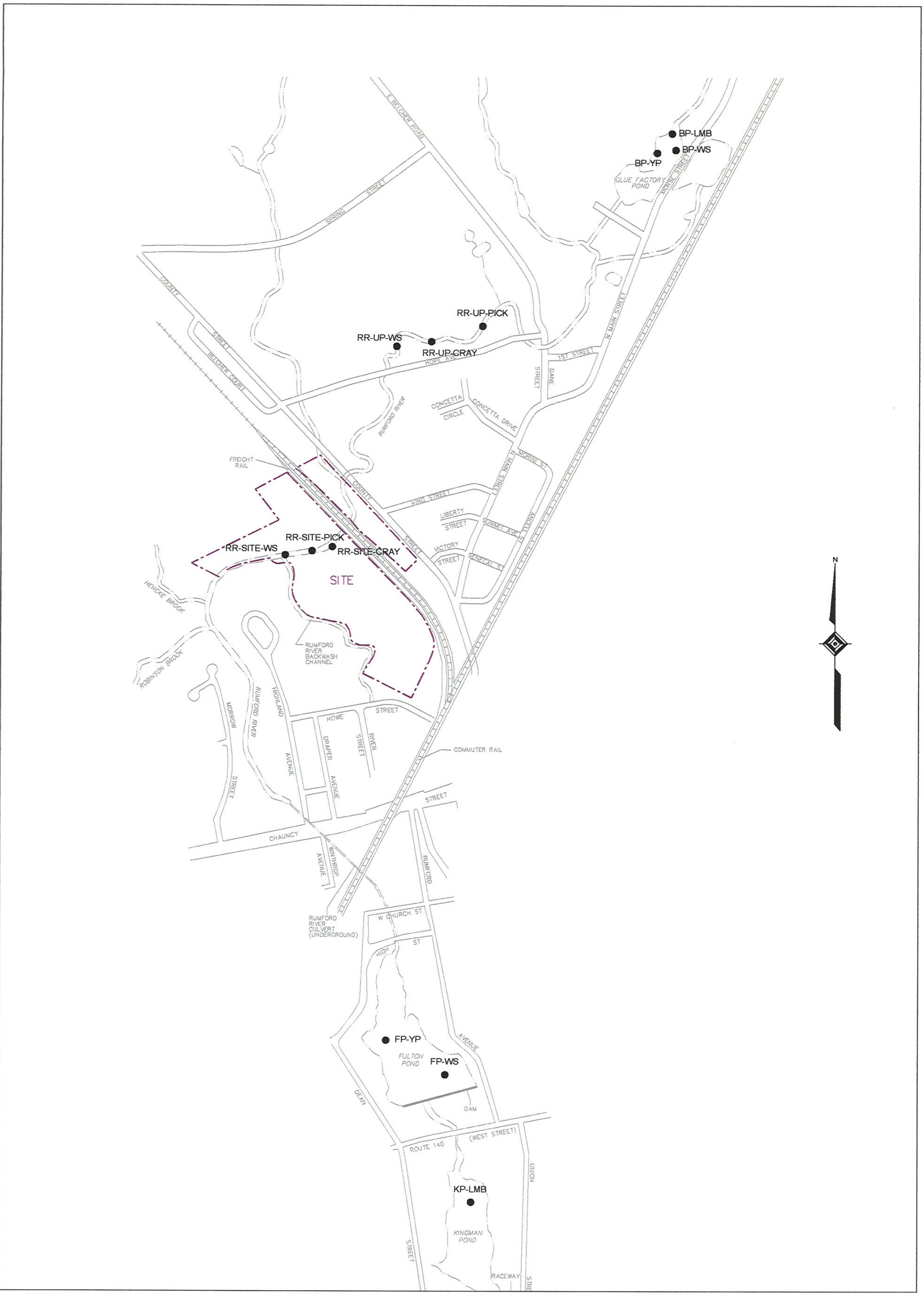
TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978–970–5600

TRC PROJ. NO.: 02136–0490–01X39

EPA CONTRACT NO.: 68–W6–0042

RAC SUBCONTRACT NO.: 107061

M&E Metcalf & Eddy



0 400 800 1200 1600

SCALE IN FEET

FIGURE 2.8–3

FISH SAMPLE LOCATIONS

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC

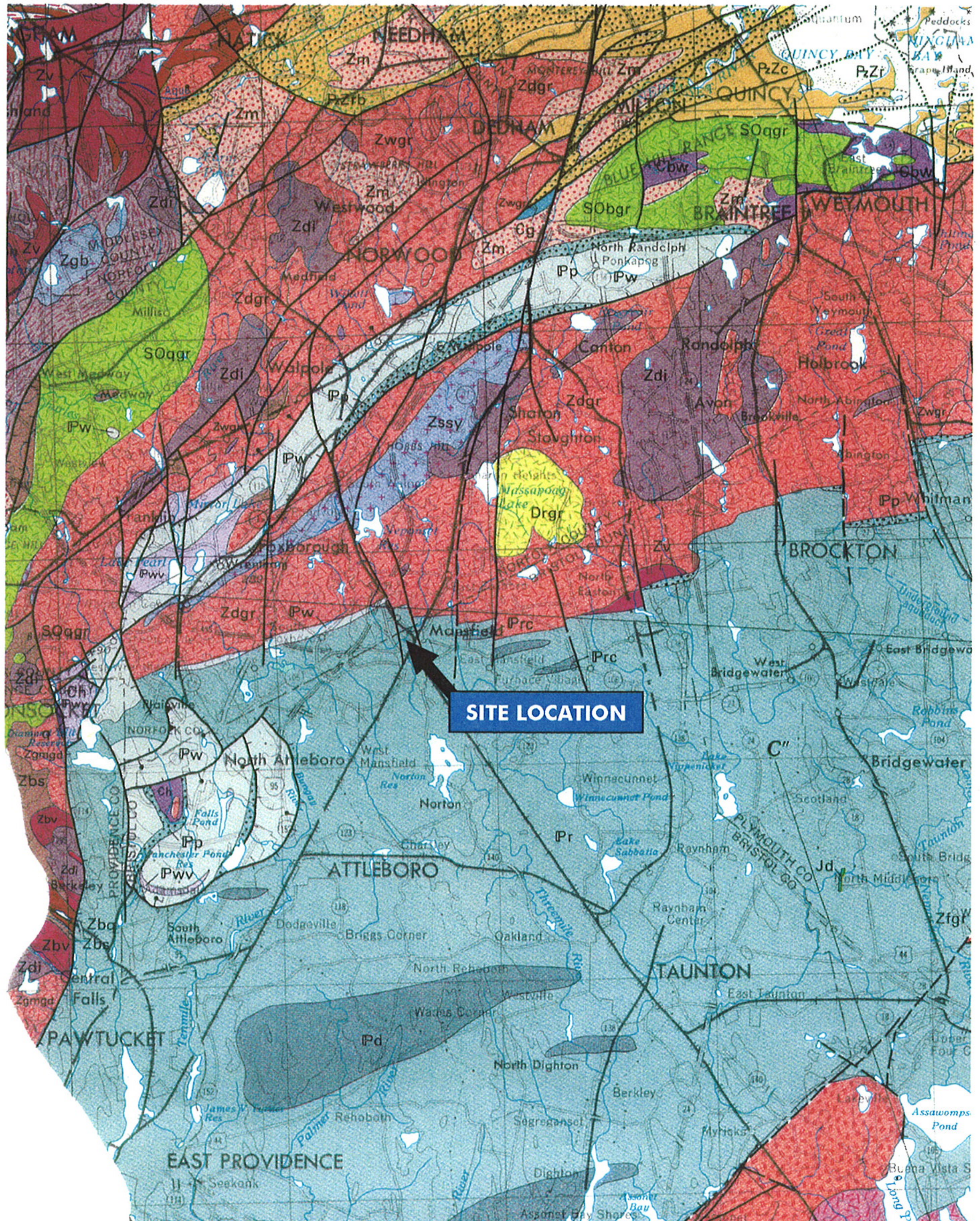
Boott Mills South
Foot of John Street
Lowell, MA 01852
978–970–5600

TRC PROJ. NO.: 02136–0490–01X39

EPA CONTRACT NO.: 68–W6–0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/FISH_SAMP



Legend:

Zdgr	**Dedham Granite (Proterozoic Z)** Light grayish-pink to greenish-gray, equigranular to slightly porphyritic, variably altered, granite south and west of Boston. Includes dioritic rock near Scituate and Cohasset and Barefoot Hills Quartz Monzonite of Lyons (1969) and Lyons and Wolfe (1971). Intrudes Zdi, Zgb, Zb, Zv
IPr	**Rhode Island Formation (Upper and Middle Pennsylvanian)** Sandstone, graywacke, shale, and conglomerate; minor beds of meta-anthracite. Fossil plants.
IPrc	Conglomerate, sandstone, and graywacke
IPw	**Wamsutta Formation (Middle and Lower Pennsylvanian)** Red to pink, well-sorted conglomerate, graywacke, sandstone, and shale; fossil plants

BASE MAP IS A PORTION OF THE FOLLOWING:
BEDROCK GEOLOGIC MAP OF MASSACHUSETTS, SHEET 1 OF 3
DEPARTMENT OF PUBLIC WORKS AND
JOSEPH A. SINNOTT, STATE GEOLOGIST, 1983

0 5 10

scale in miles

N

FIGURE 3.1-1
BEDROCK GEOLOGY MAP

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACTOR NO.: 107061

02136/HATHAWAY/RI/RI REPORT/BEDROCK

October 1935

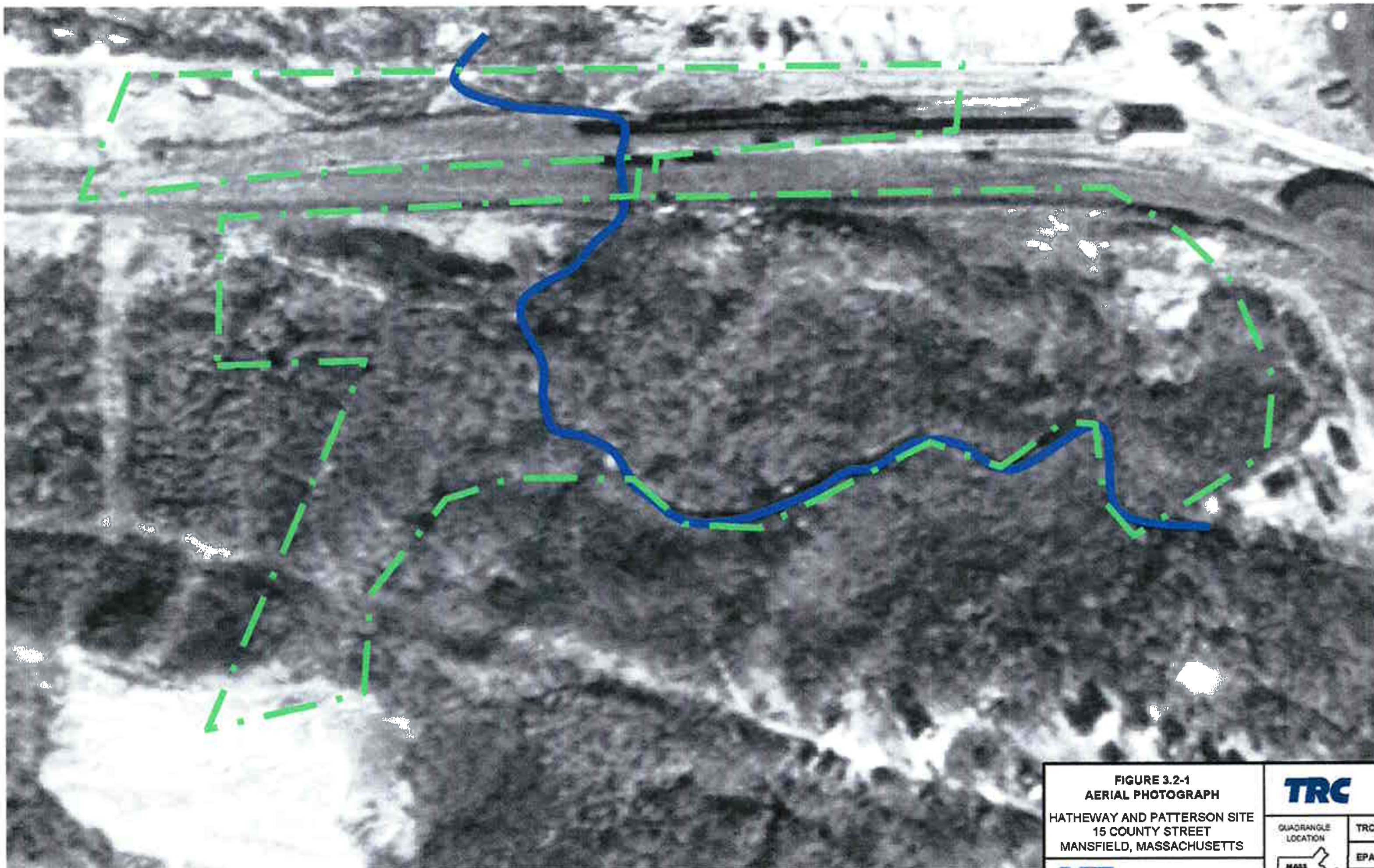


FIGURE 3.2-1
AERIAL PHOTOGRAPH

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/AERIALS

October 1951

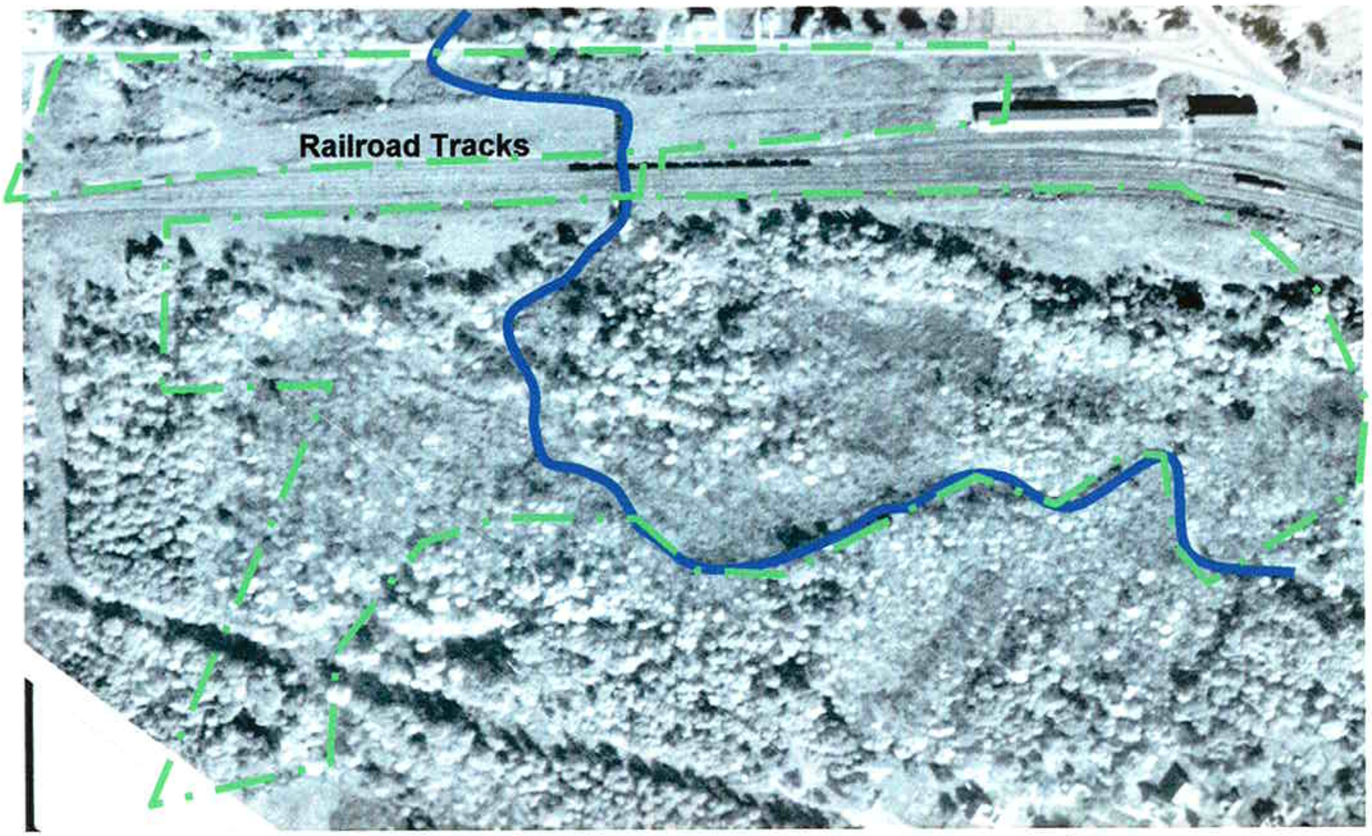


FIGURE 3.2-2
AERIAL PHOTOGRAPH

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/AERIALS

May 1956

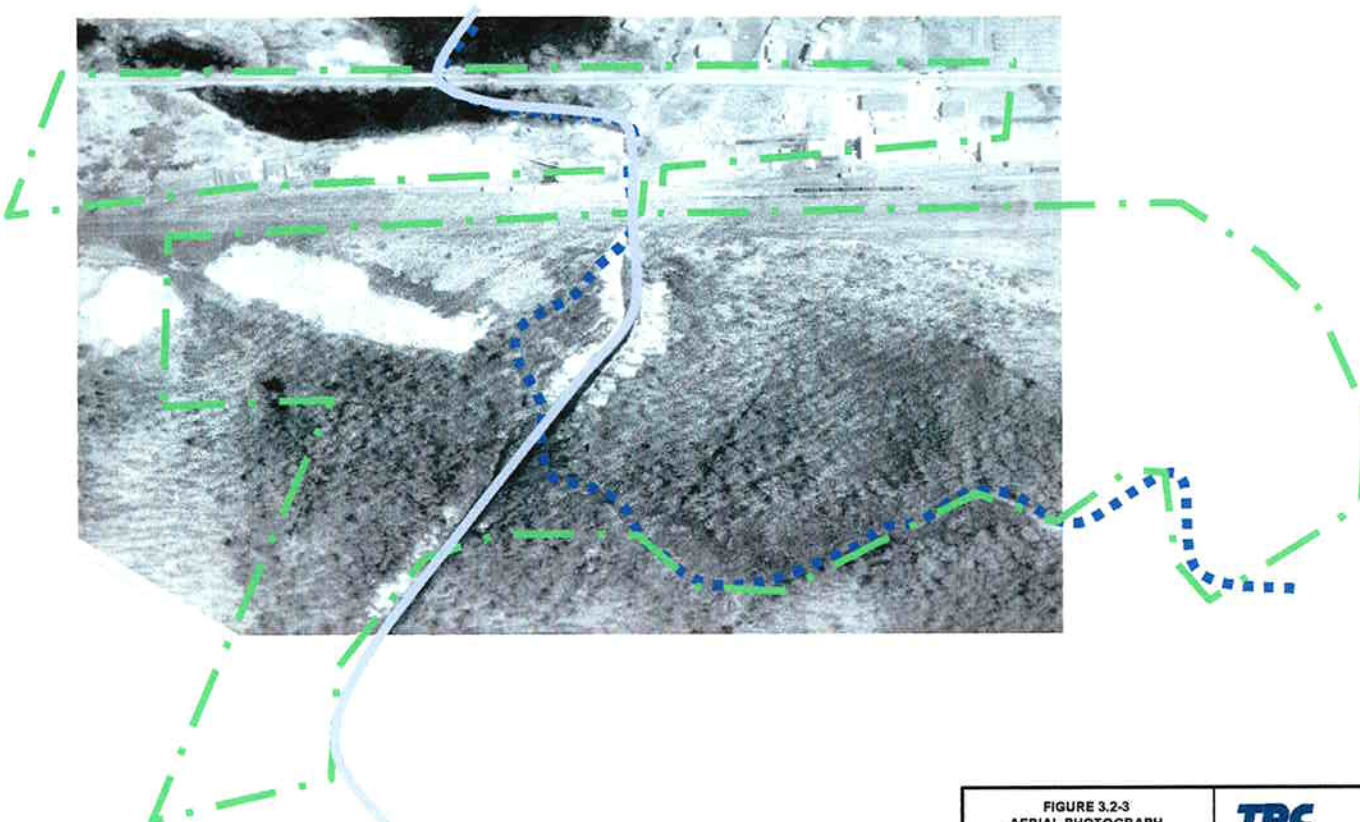


FIGURE 3.2-3
AERIAL PHOTOGRAPH

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/AERIALS

April 1961

FIGURE 3.2-4
AERIAL PHOTOGRAPH

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/AERIALS

November 1965

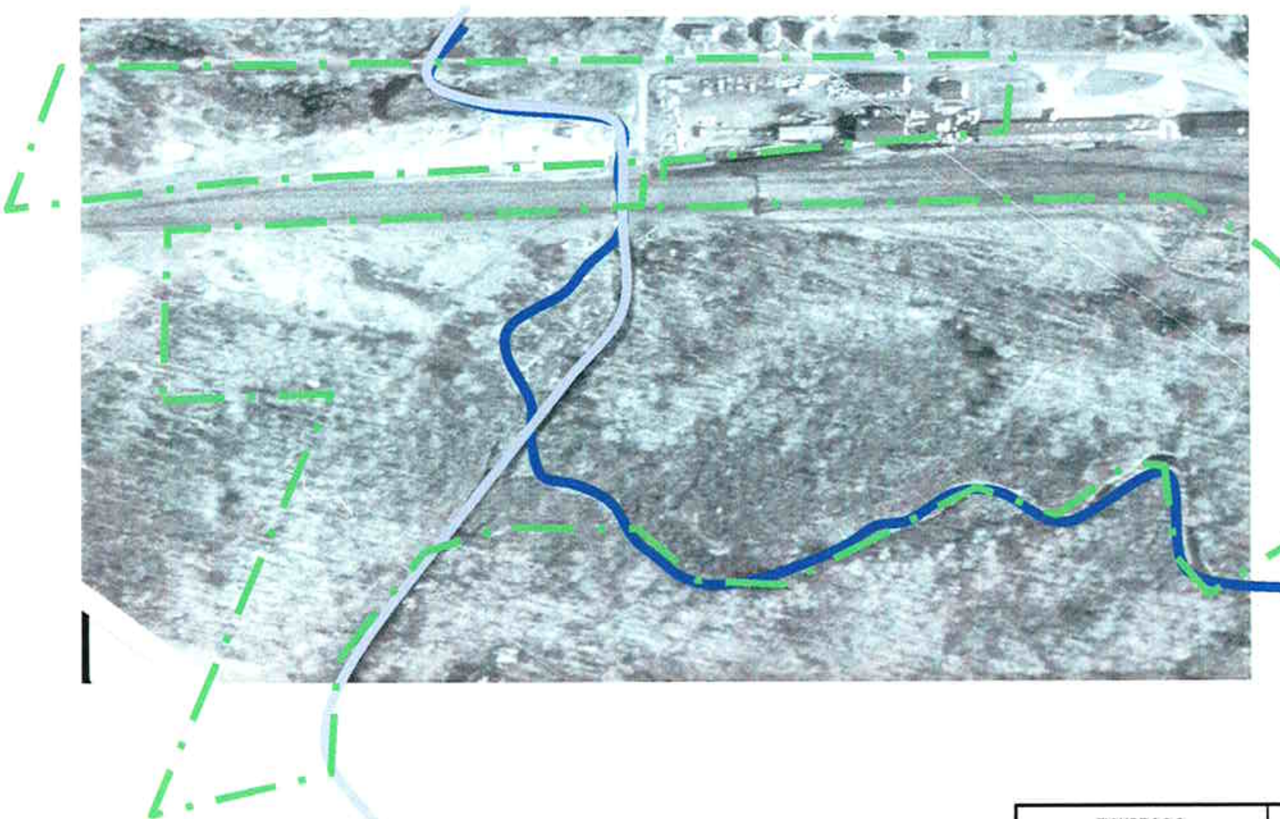


FIGURE 3.2-5
AERIAL PHOTOGRAPH

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.:	02136-0490-01X39
EPA CONTRACT NO.:	68-W6-0042
RAC SUBCONTRACT NO.:	107061

02136/HATHAWAY/RI/RI REPORT/AERIALS

July 1975

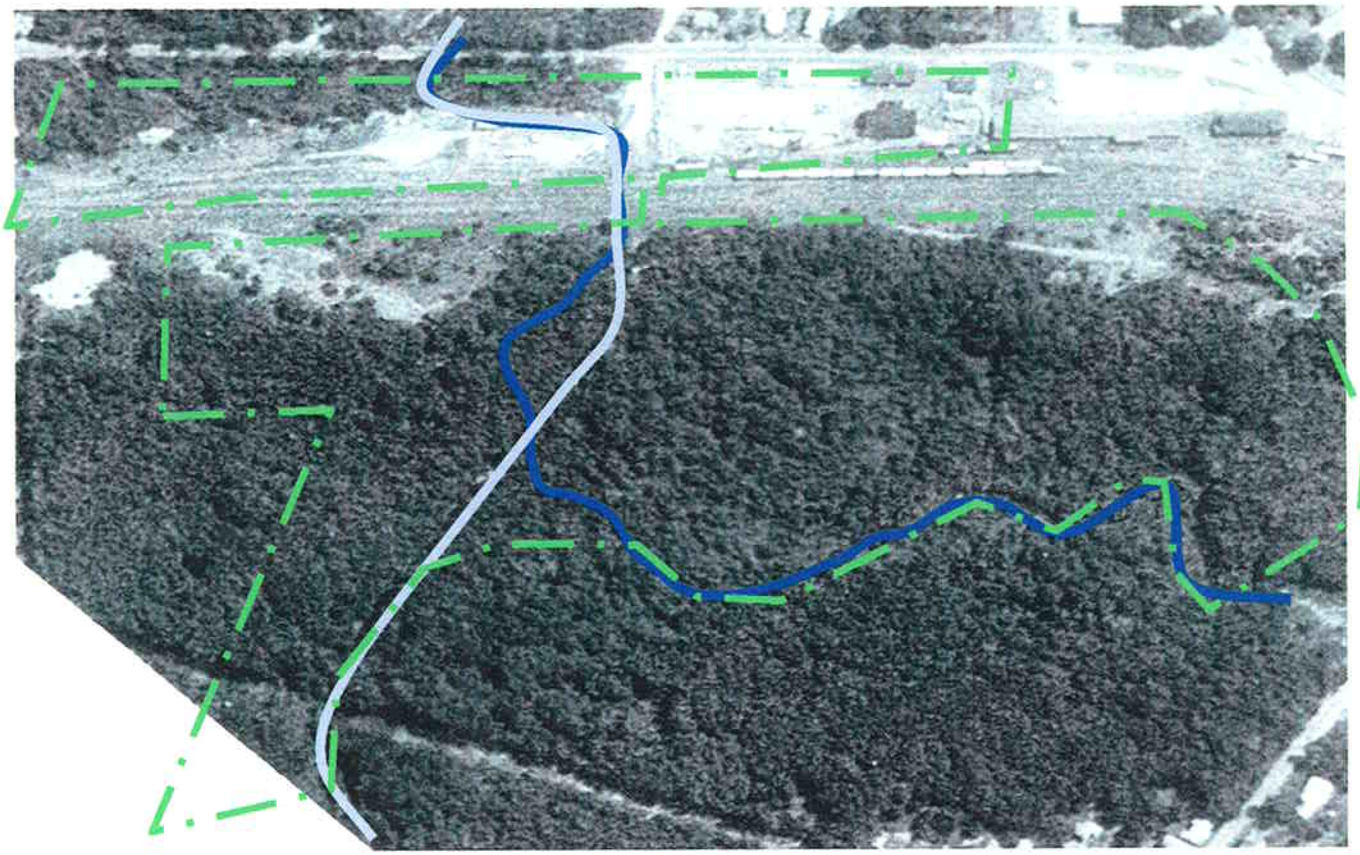


FIGURE 3.2-6
AERIAL PHOTOGRAPH

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/AERIALS

May 1980

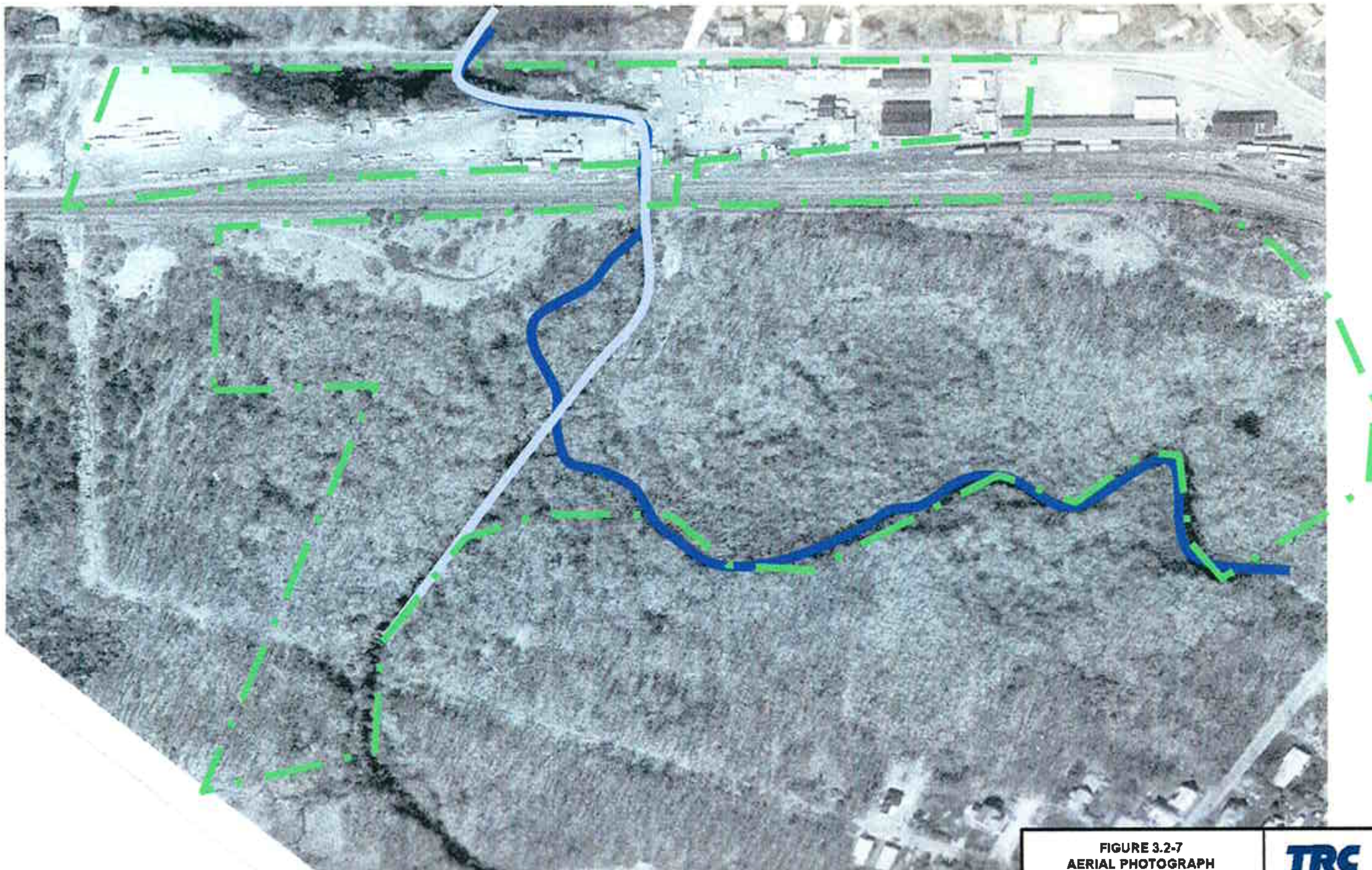


FIGURE 3.2-7
AERIAL PHOTOGRAPH

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/AERIALS

May 1985

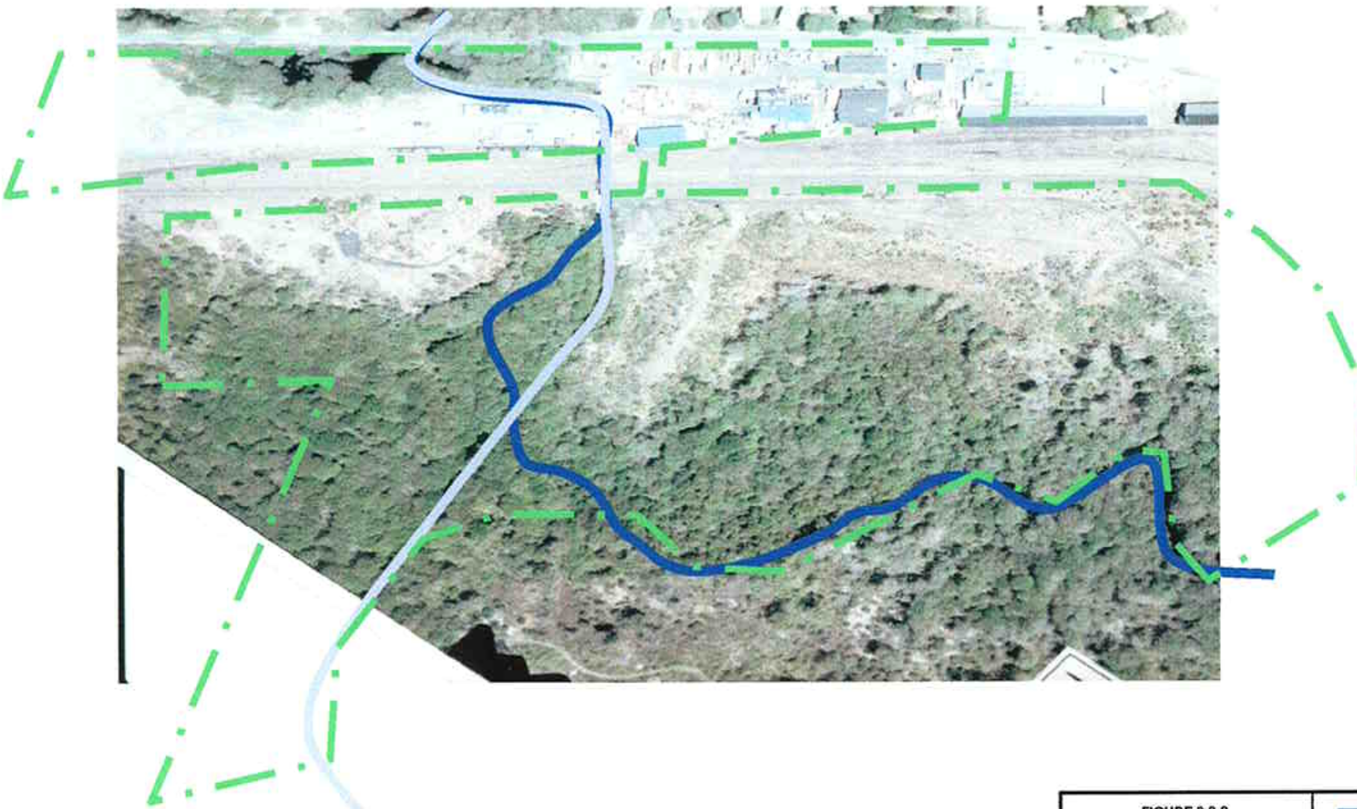


FIGURE 3.2-8
AERIAL PHOTOGRAPH

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/AERIALS

March 1990

FIGURE 3.2-9
AERIAL PHOTOGRAPH

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

MASS

TRC PROJ. NO.: 02136-0490-01X39
EPA CONTRACT NO.: 68-W6-0042
RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/AERIALS

March 1995

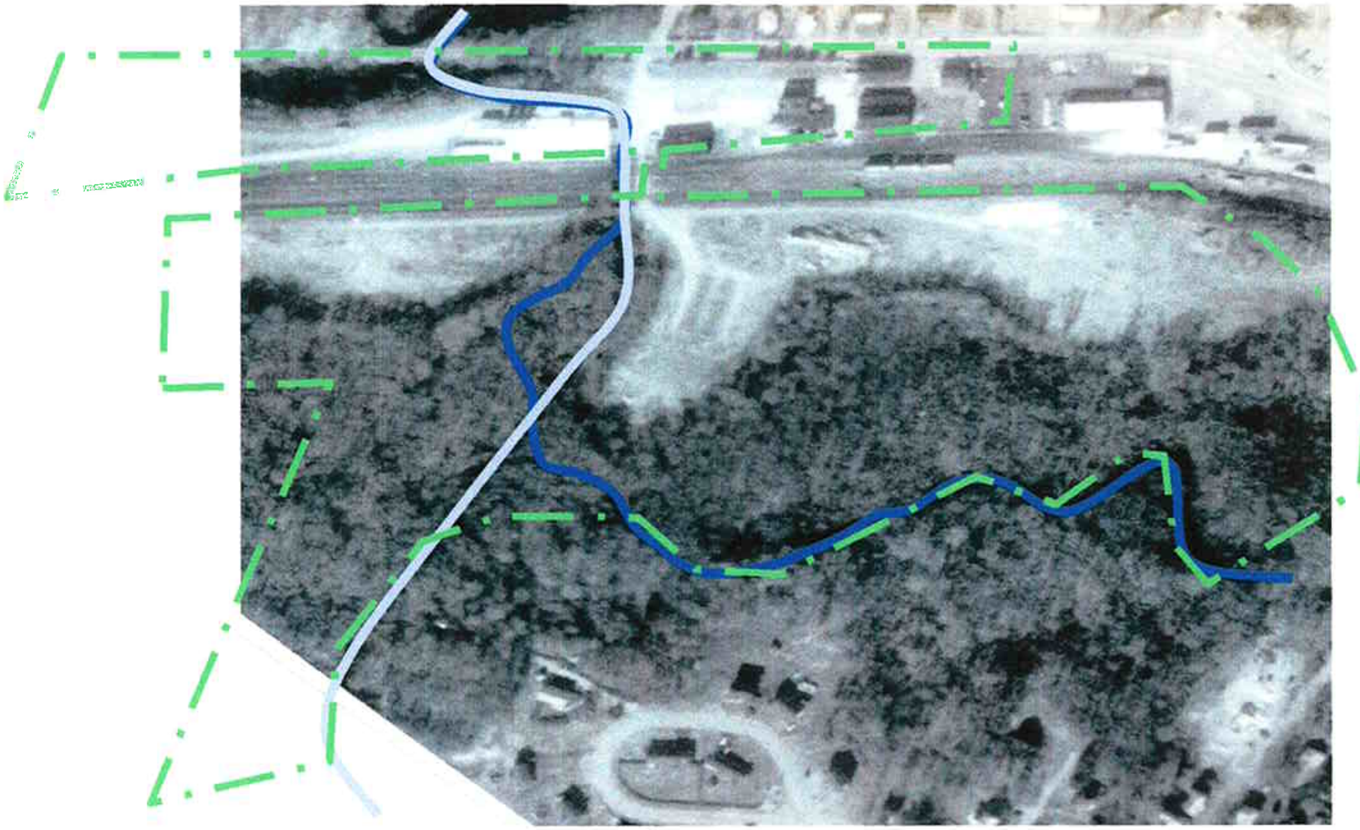


FIGURE 3.2-10 **AERIAL PHOTOGRAPH** HATHEWAY AND PATTERSON SITE 15 COUNTY STREET MANSFIELD, MASSACHUSETTS	TRC	Boott Mills South Foot of John Street Lowell, MA 01852 978-970-5600
Metcalf & Eddy	QUADRANGLE LOCATION MASS	TRC PROJ. NO.: 02136-0490-01X39 EPA CONTRACT NO.: 68-W6-0042 RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/AERIALS

Hatheway & Patterson Site 2001

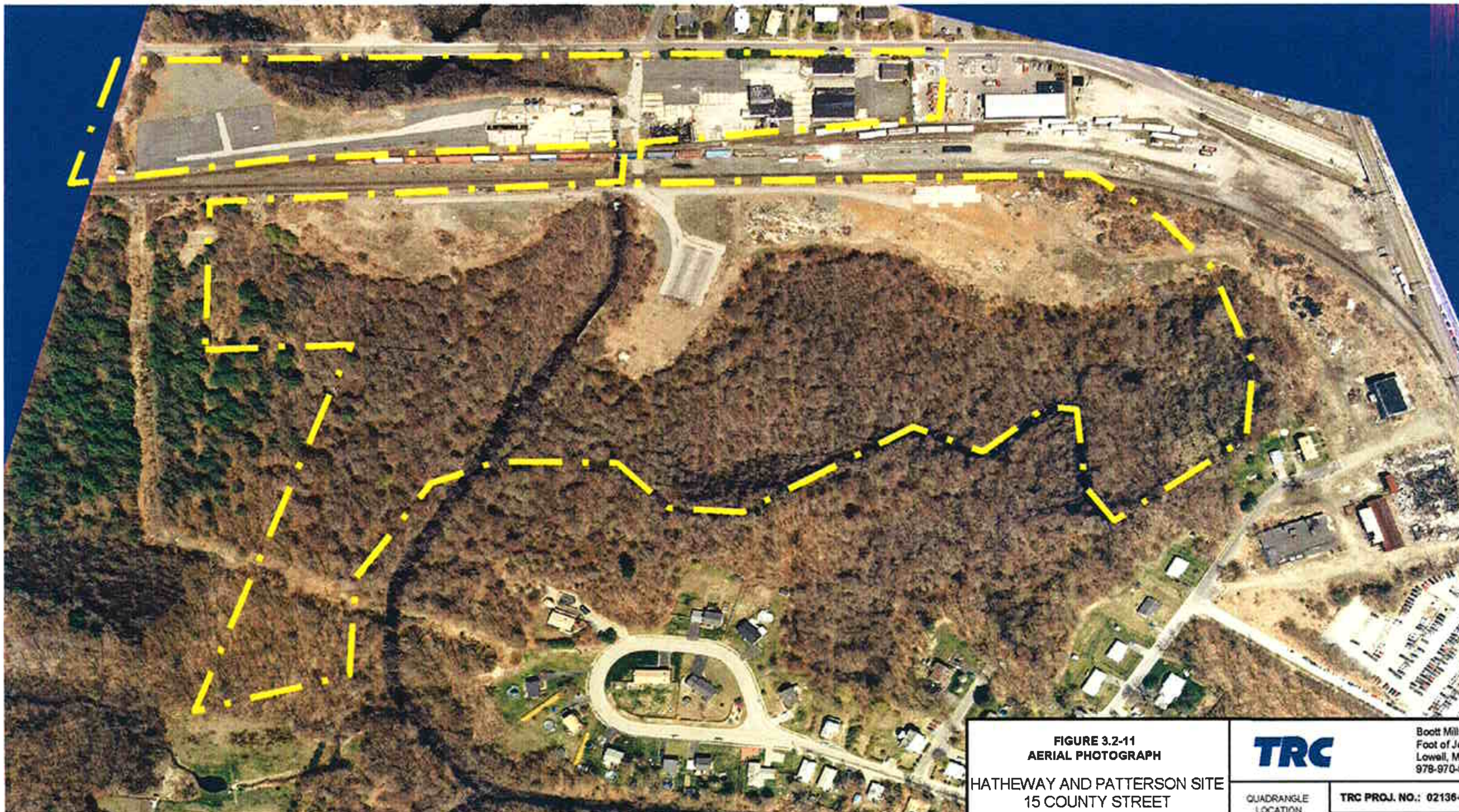


FIGURE 3.2-11
AERIAL PHOTOGRAPH

HATHEWAY AND PATTERSON SITE
15 COUNTY STREET
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

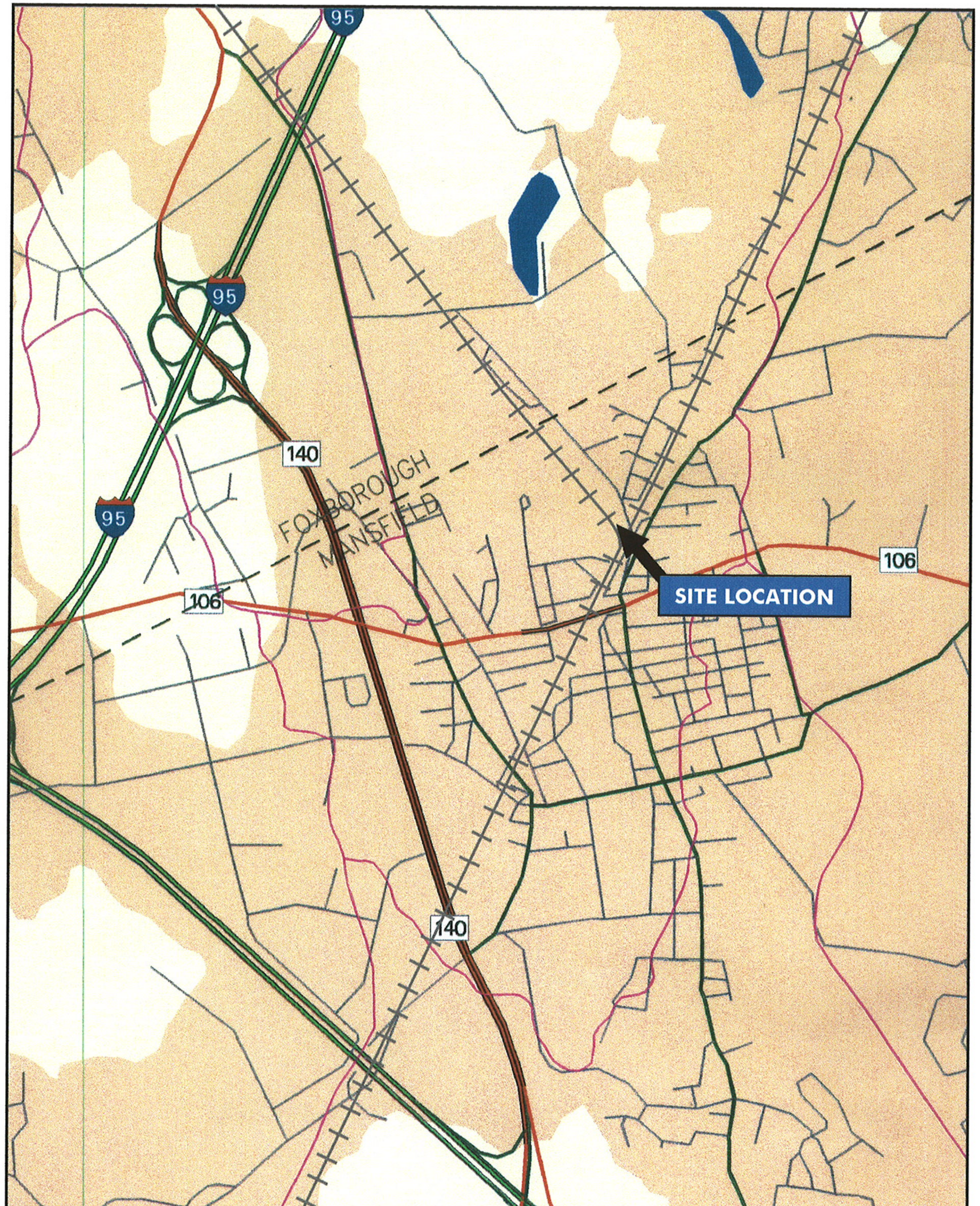
MASS

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/AERIALS



Legend:

- Sand and Gravel Deposits
- Till or Bedrock

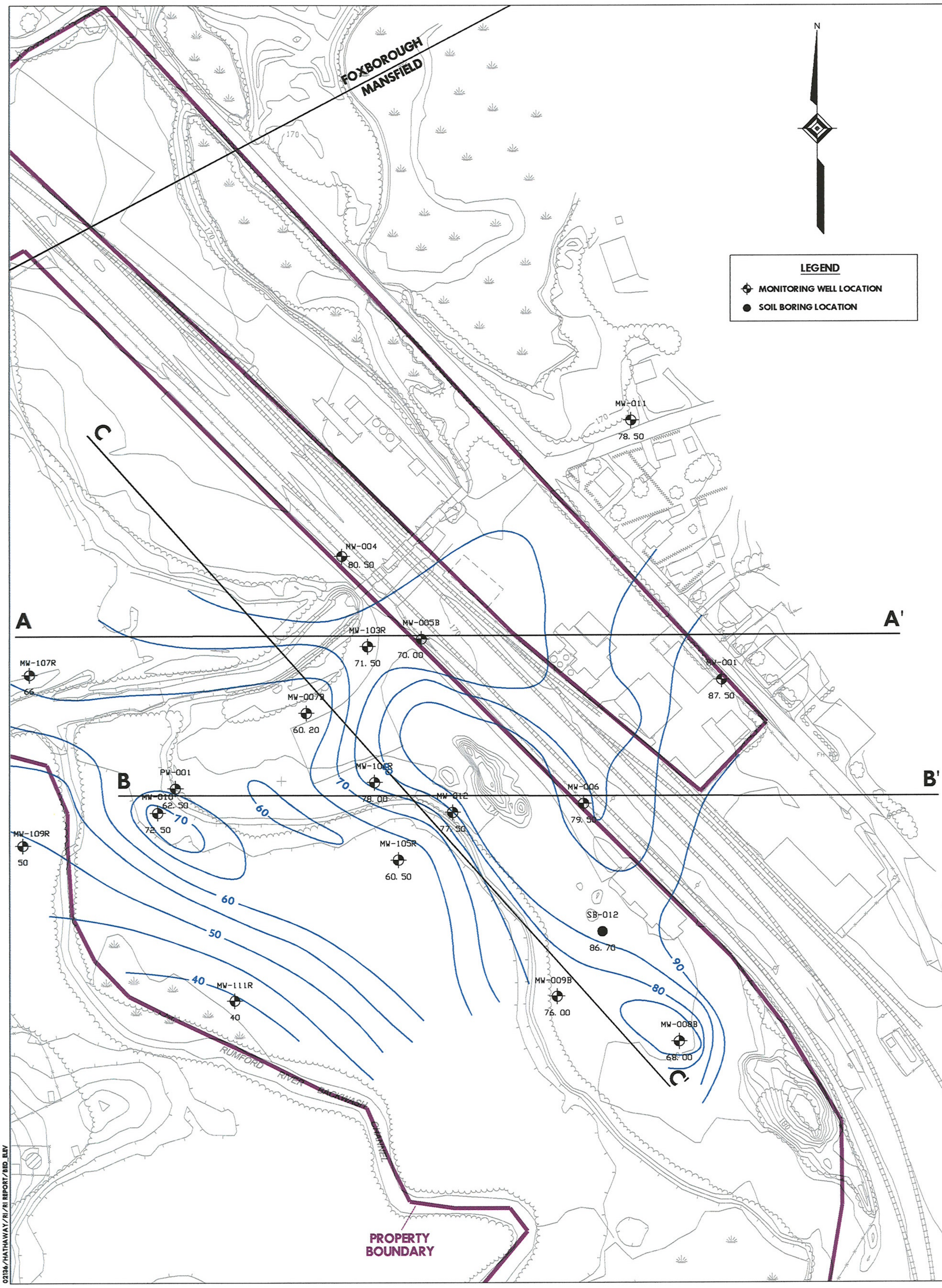
- Town Boundary
- County Boundary
- Major Basin Boundary
- Sub-Basin Boundary
- Quadrangle Boundary
- Railroad
- Pipeline
- Limited Access Highway
- Multi-lane Hwy, not Limited Access
- Other Numbered Highway
- Major Collector
- Minor Street or Road
- Track
- Trail

BASE MAP IS A PORTION OF THE FOLLOWING:
SURFICIAL GEOLOGIC MAP, QUADS 100, 107
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
JULY 6, 2001

0 1000 2000
Scale in Feet

FIGURE 3.2-12 SURFICIAL GEOLOGY MAP HATHEWAY AND PATTERSON SITE 15 COUNTY STREET MANSFIELD, MASSACHUSETTS	TRC	Boott Mills South Foot of John Street Lowell, MA 01852 978-970-5600
	QUADRANGLE LOCATION MASS	TRC PROJ. NO.: 02136-0490-01X39
		EPA CONTRACT NO.: 68-W6-0042
M&E Metcalf & Eddy		RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI REPORT/SURFICIAL



0 75 150 225 300

SCALE IN FEET

FIGURE 3.2-13

BEDROCK ELEVATION MAP

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

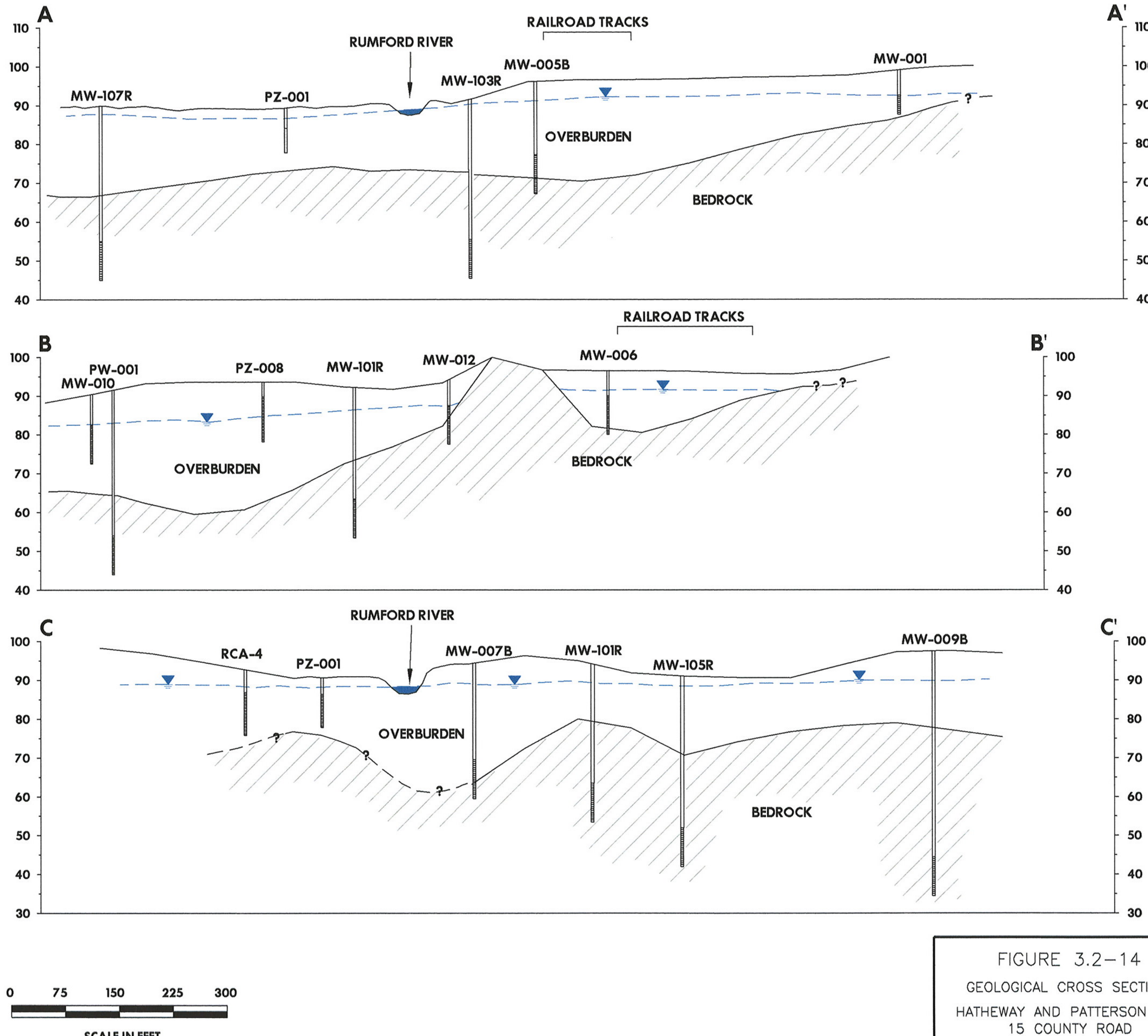


FIGURE 3.2–14

GEOLOGICAL CROSS SECTIONS

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

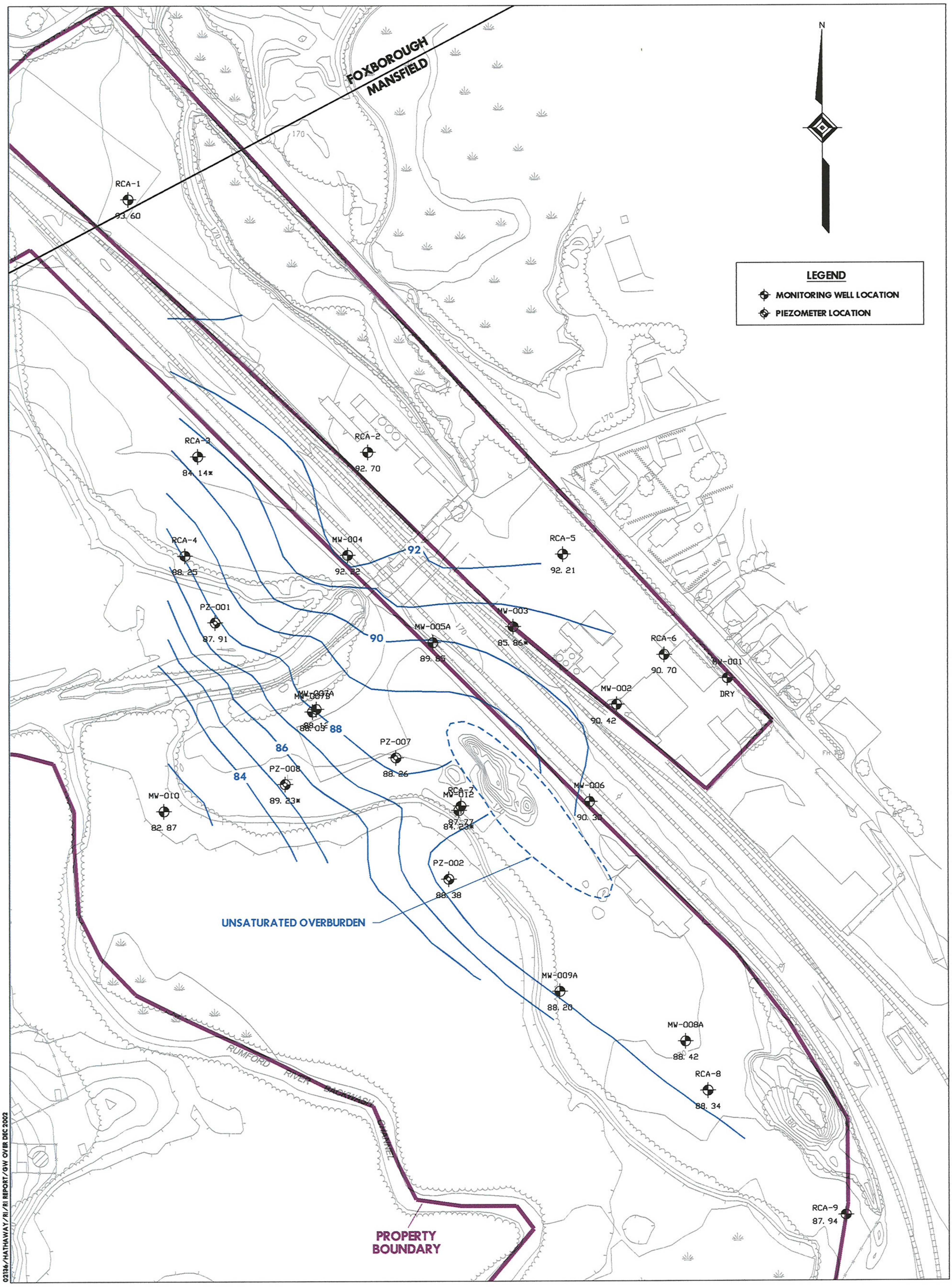
TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/CS1



NOTE:
* INDICATES ELEVATION NOT USED FOR CONTOUR

0 75 150 225 300

SCALE IN FEET

FIGURE 3.2-15

OVERBURDEN GROUND WATER ELEVATION MAP (DECEMBER 2002)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

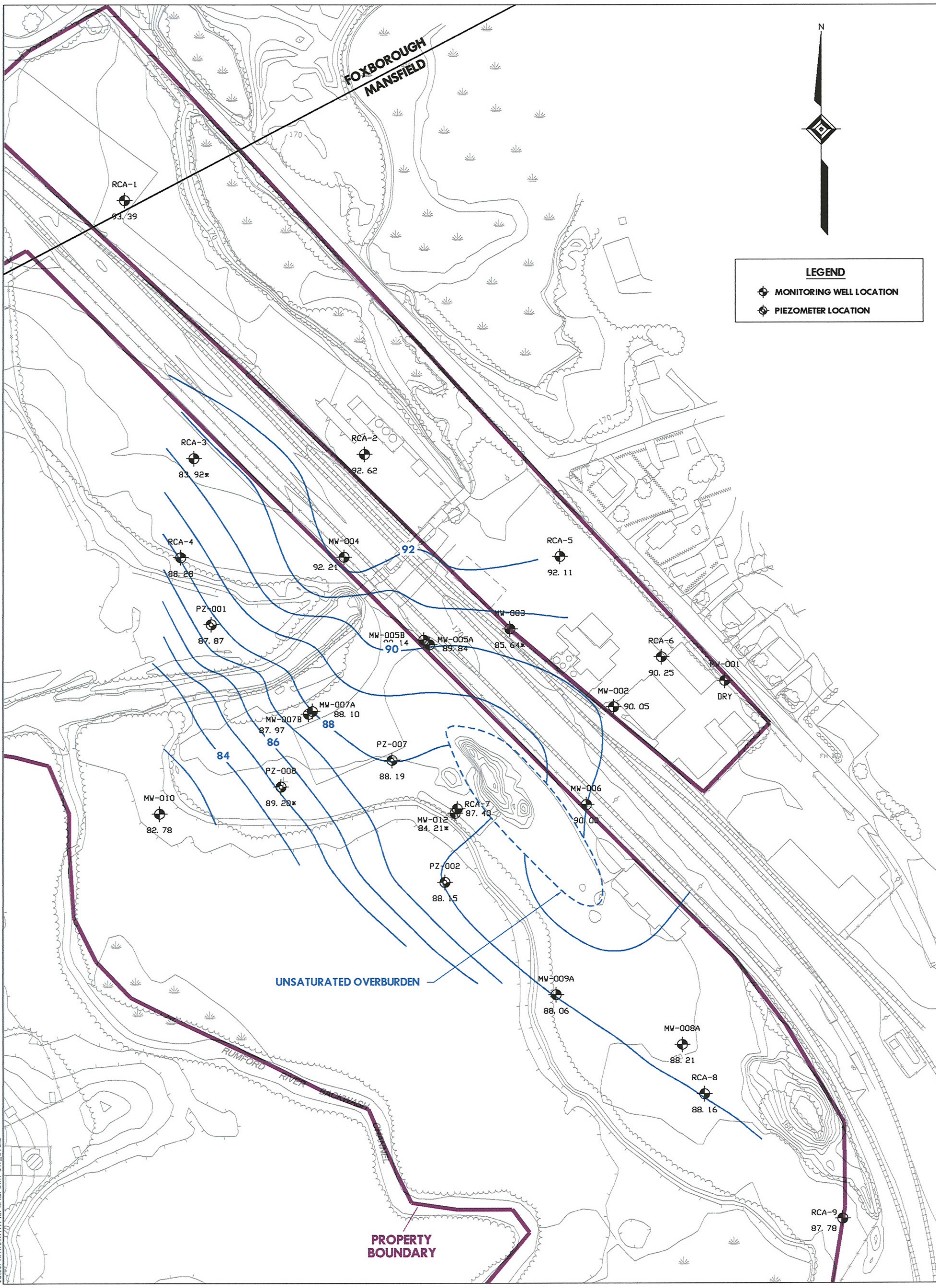
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



NOTE:
* INDICATES ELEVATION NOT USED FOR CONTOUR

0 75 150 225 300

SCALE IN FEET

FIGURE 3.2-16
OVERBURDEN GROUND WATER ELEVATION MAP (DECEMBER 2003)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

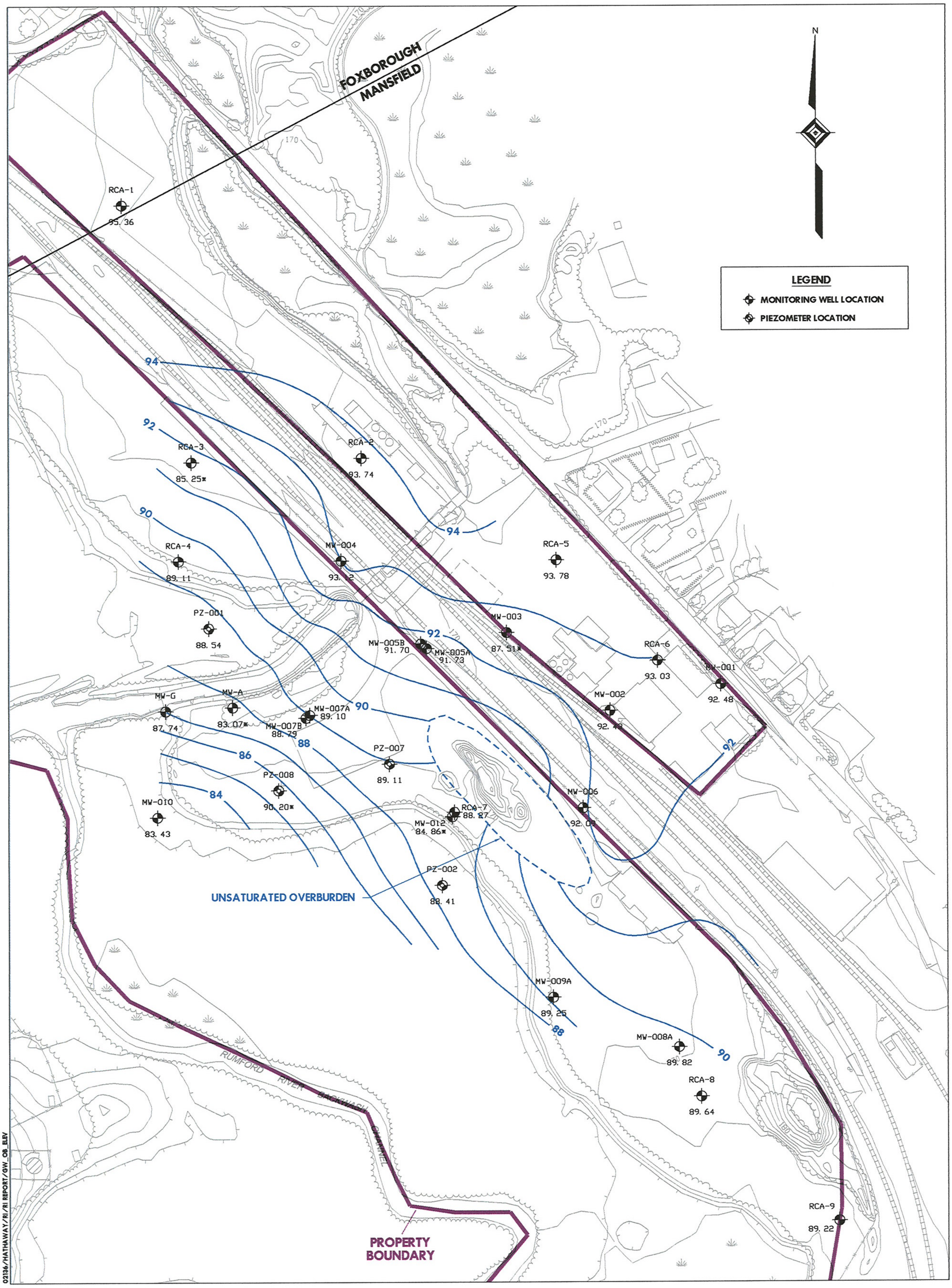
M&E Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



0 75 150 225 300

SCALE IN FEET

FIGURE 3.2-17

OVERBURDEN GROUND WATER ELEVATION MAP (APRIL 2004)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

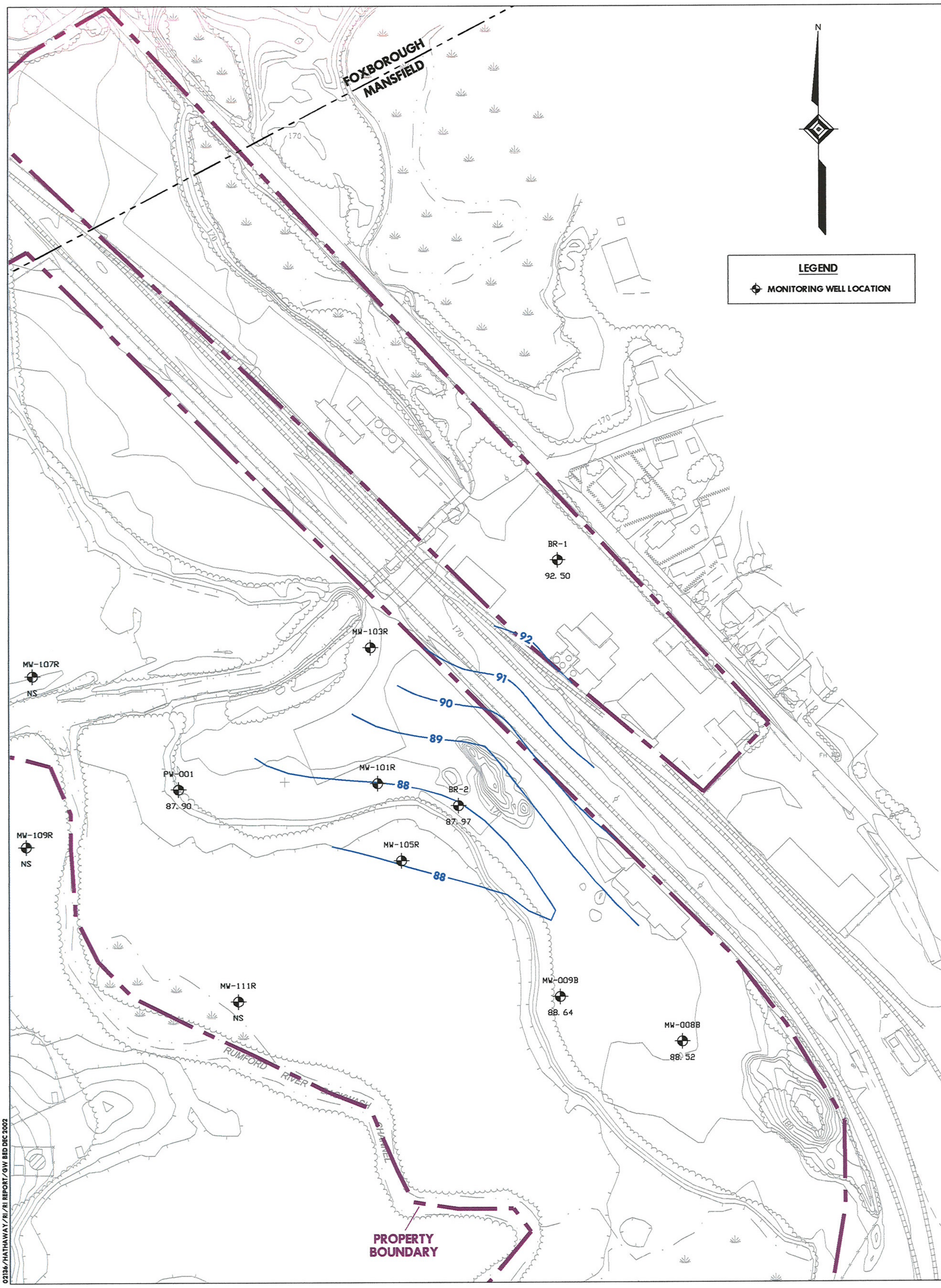
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



NOTE:
NS - NOT SURVEYED

0 75 150 225 300

SCALE IN FEET

FIGURE 3.2-18

BEDROCK GROUND WATER ELEVATION MAP (DECEMBER 2002)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

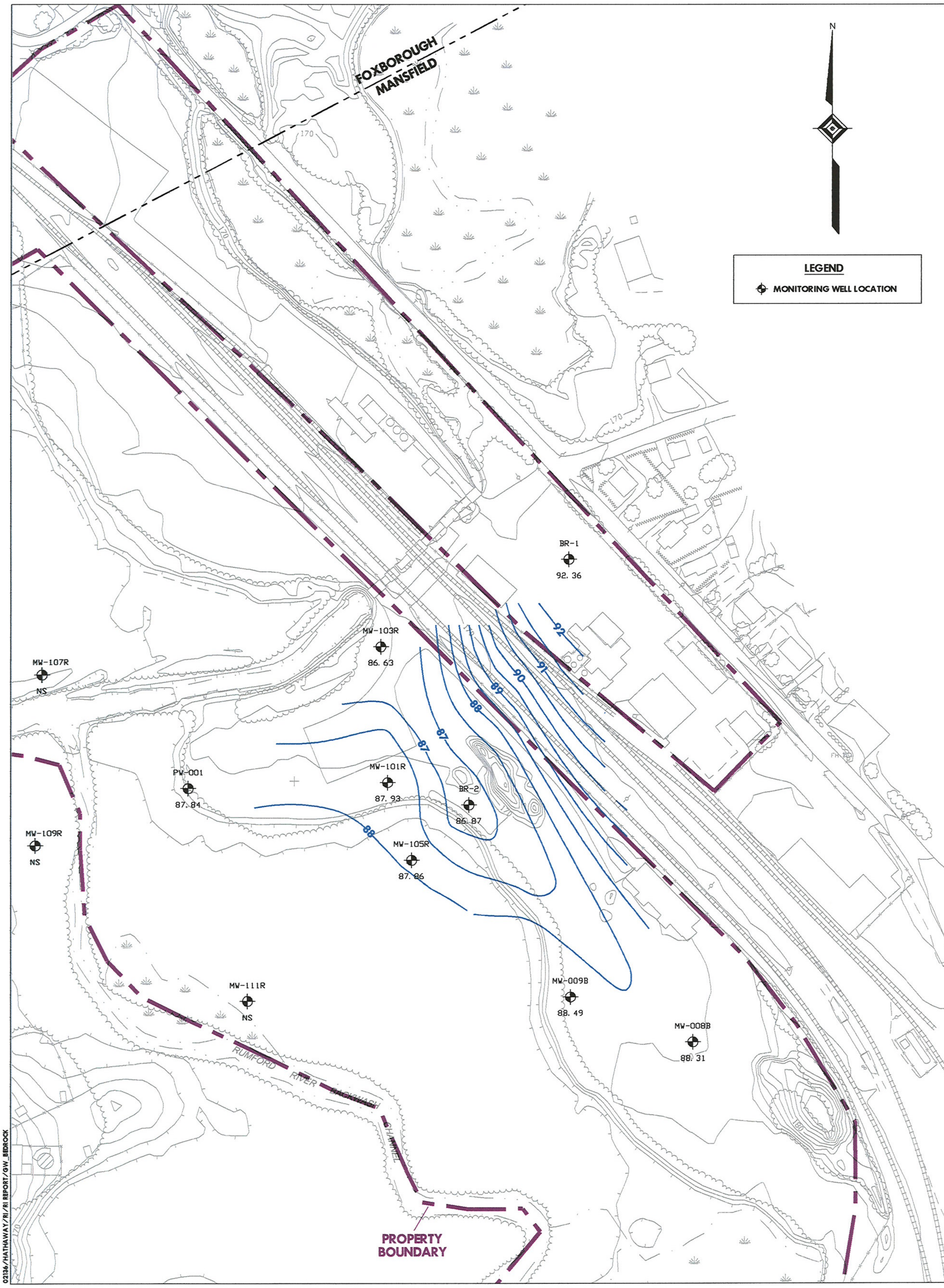
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



NOTE:
* NS - NOT SURVEYED

0 75 150 225 300

SCALE IN FEET

FIGURE 3.2-19
BEDROCK GROUND WATER ELEVATION MAP (DECEMBER 2003)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

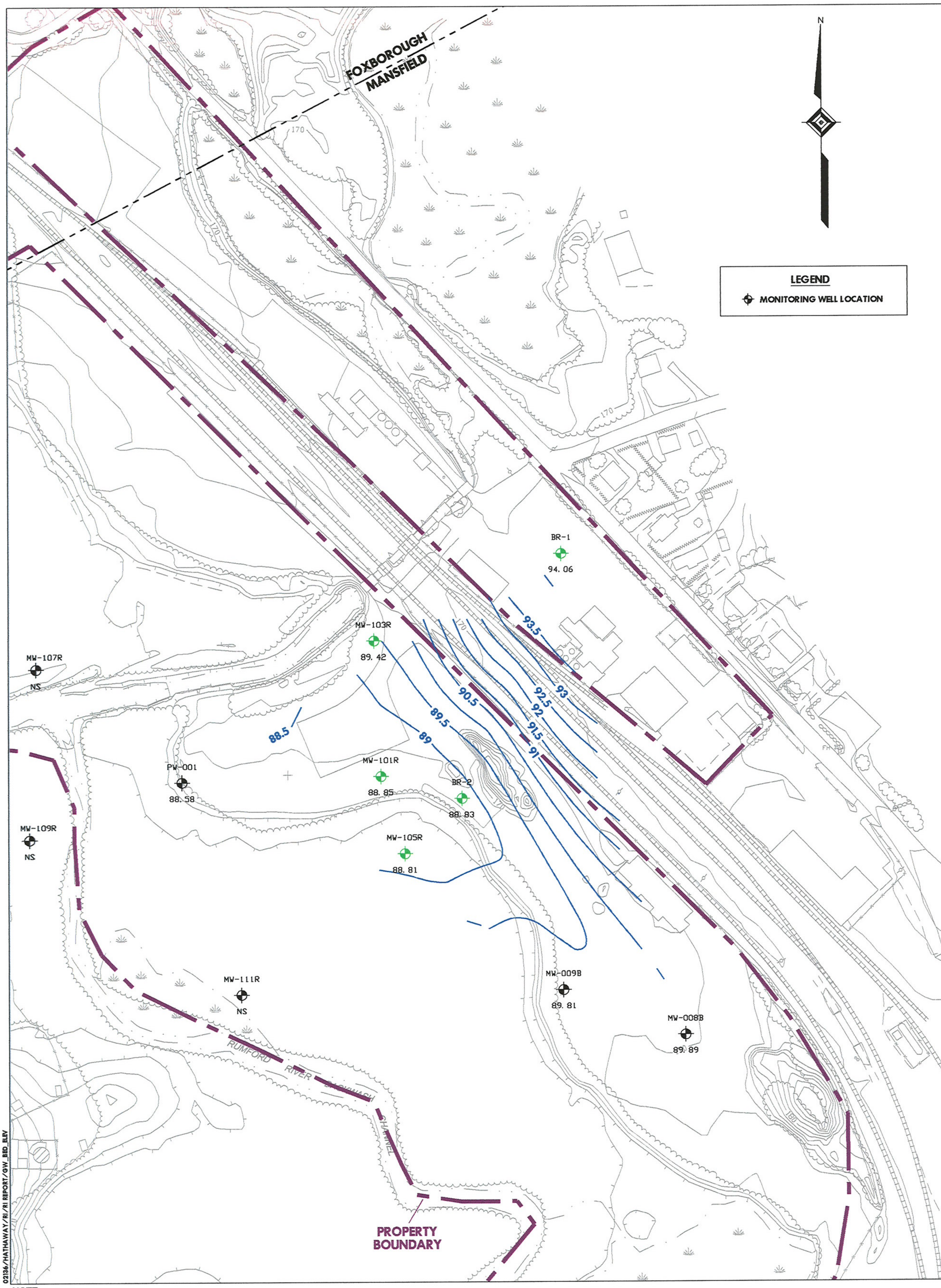
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



NOTE:
NS - NOT SURVEYED

FIGURE 3.2-20

BEDROCK GROUND WATER ELEVATION MAP (APRIL 2004)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

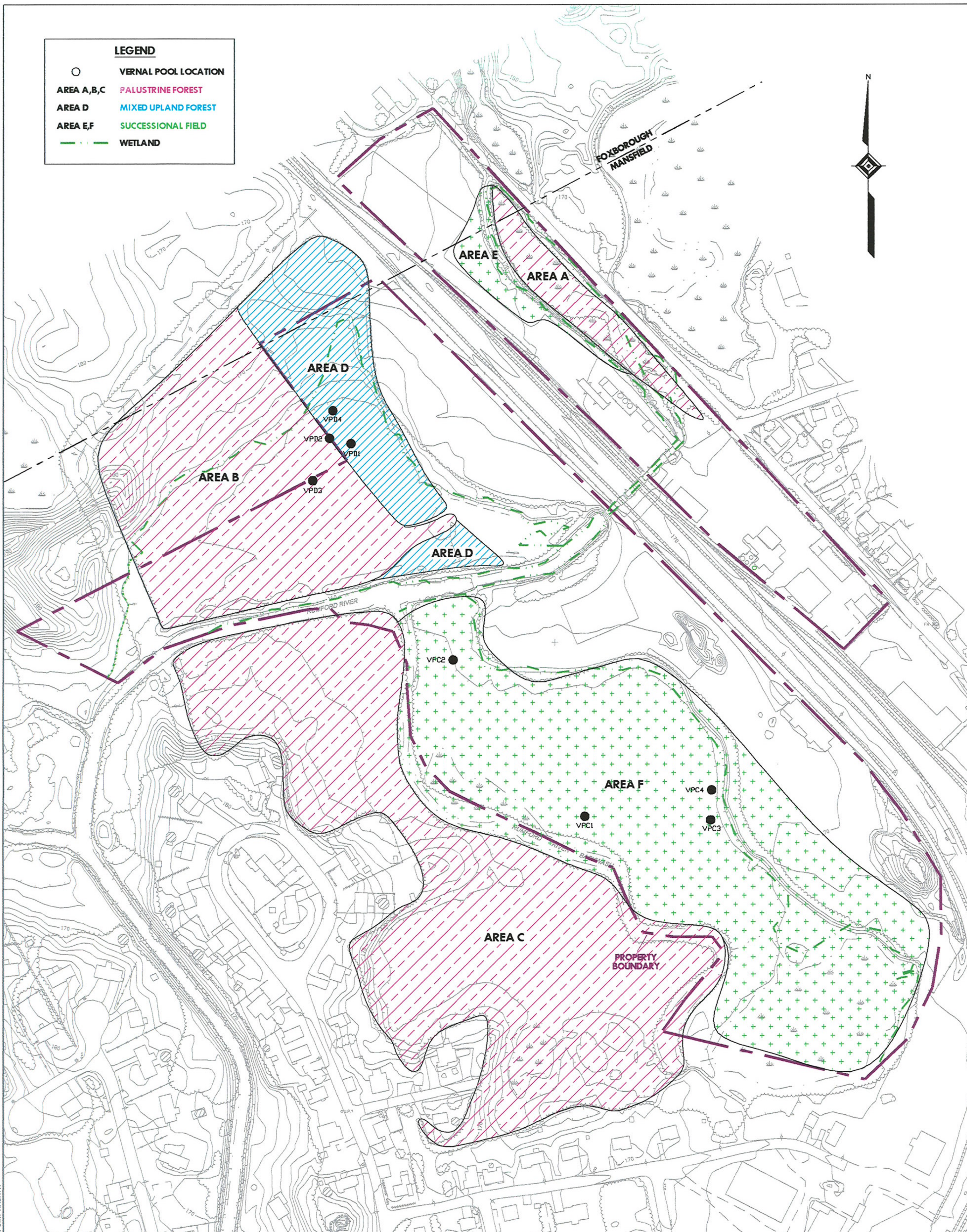
M&E Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



SOURCE:
DELINEATED HABITAT AREAS WHERE INTERPRETED FROM A MAP (NOT TO SCALE) PREPARED BY METCALF & EDDY, FINAL HABITAT EVALUATION SURVEY TECHNICAL MEMORANDUM, FIGURE 2, HATHAWAY & PATTERSON SUPERFUND SITE, MANSFIELD, MASSACHUSETTS, JANUARY 2002.

0 225 450

SCALE IN FEET

FIGURE 3.2–21

HABITATS

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

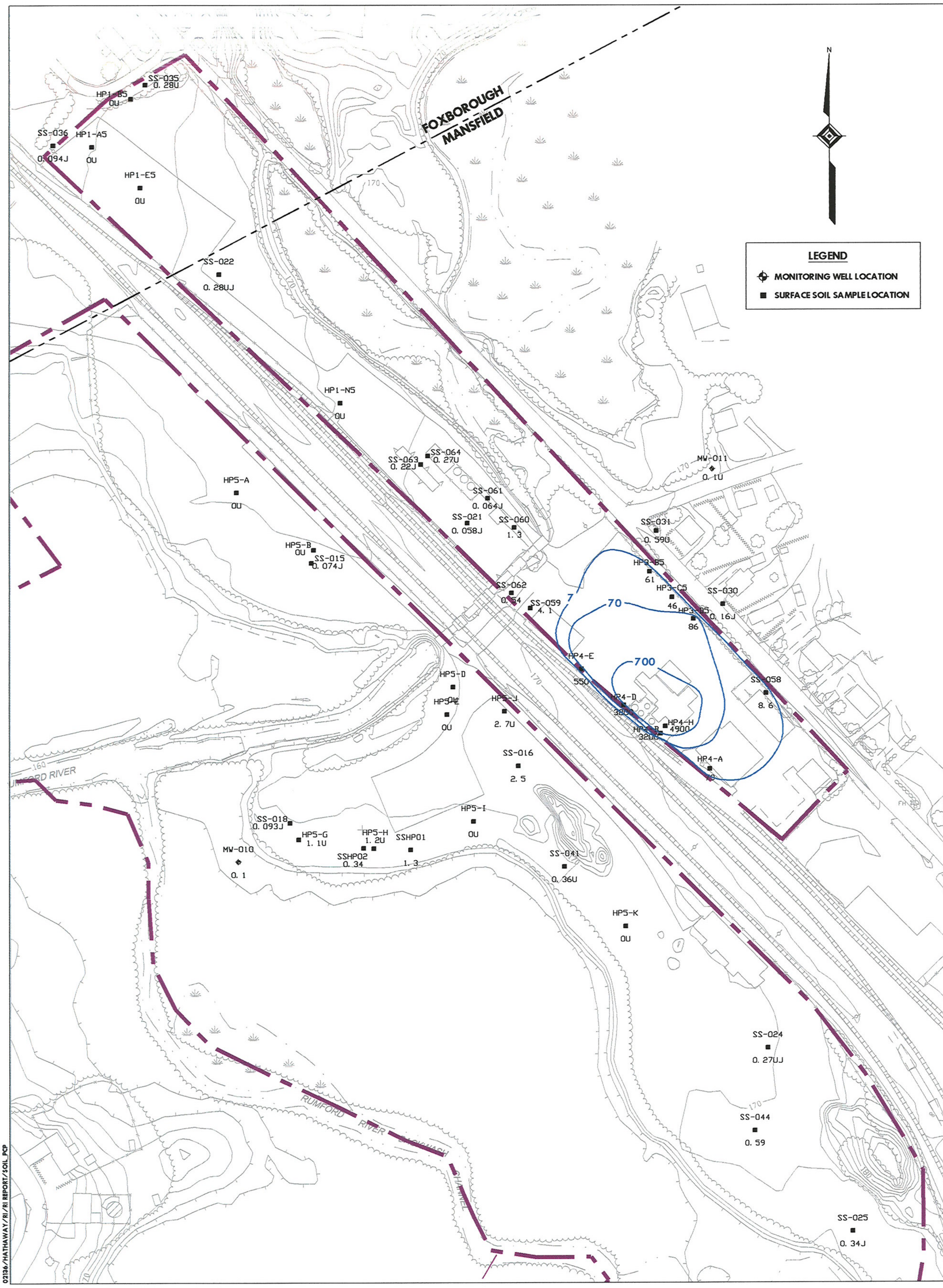
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



02136/HATHAWAY/RI/RI REPORT/SOIL_PCP

DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT
UJ = ESTIMATED NONDETECT
J = ESTIMATED VALUE
0U = NOT DETECTED; DETECTION LIMIT NOT AVAILABLE

0 75 150 225 300
SCALE IN FEET

FIGURE 4.1-1

PCP IN SURFACE SOIL (mg/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

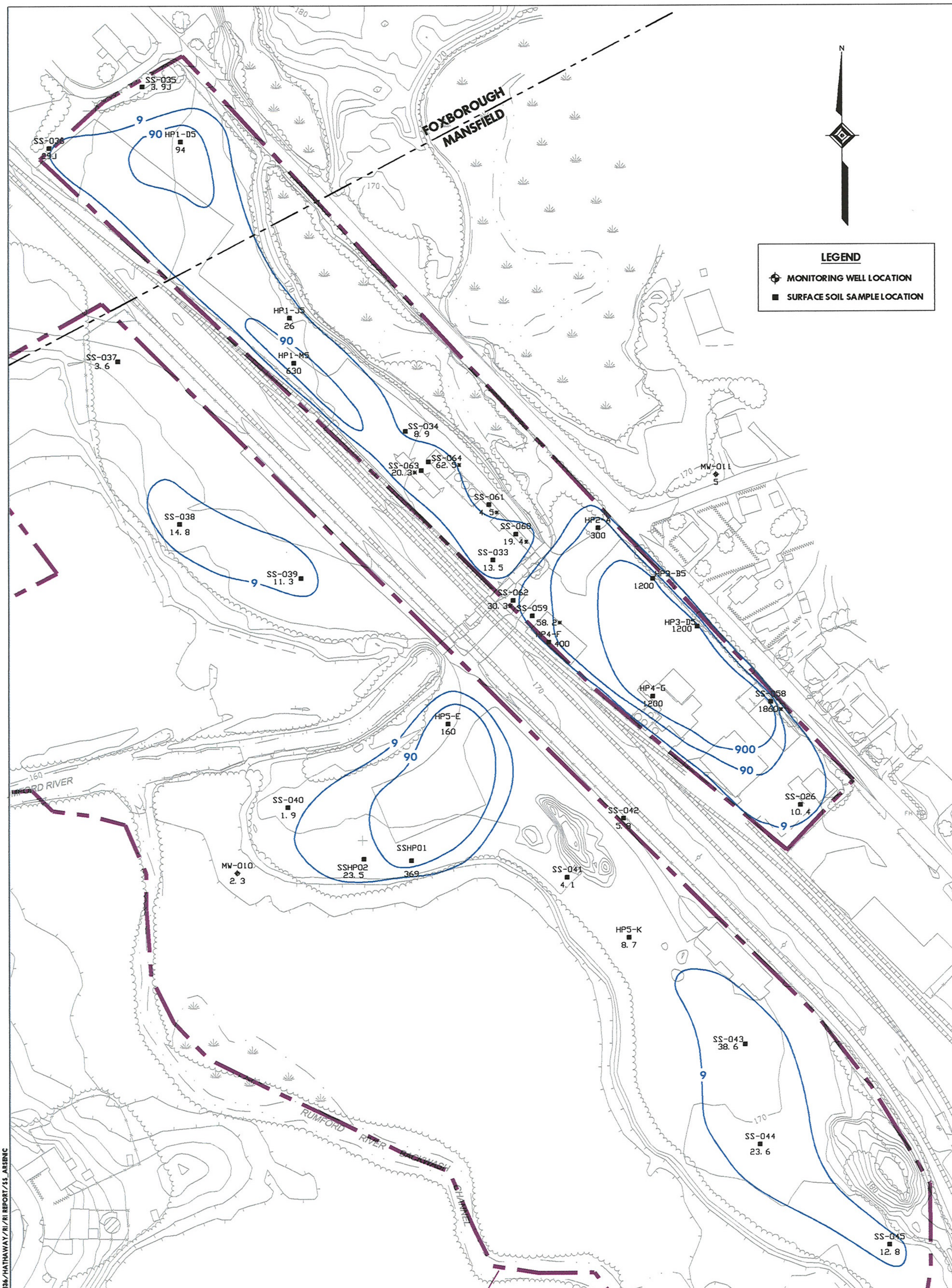
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT
UJ = ESTIMATED NONDETECT
J = ESTIMATED VALUE
⁕ = DUPLICATE ANALYSIS NOT WITHIN CONTROL LIMITS
+ = FIELD SCREENING RESULT
0U = NOT DETECTED; DETECTION LIMIT NOT AVAILABLE

0 75 150 225 300

SCALE IN FEET

FIGURE 4.1–2

ARSENIC IN SURFACE SOIL (mg/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

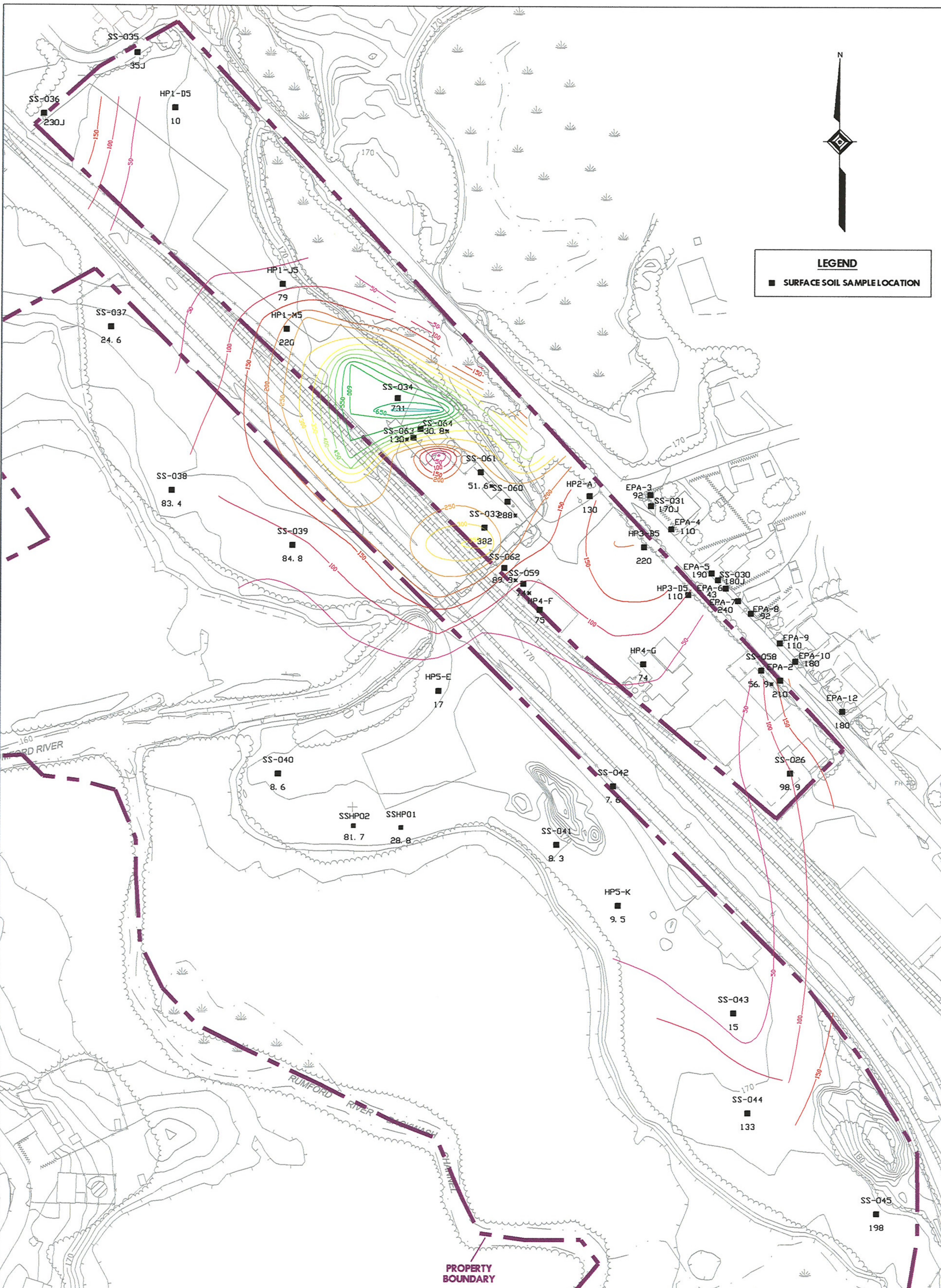
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



02136/HATHAWAY/RI/RI REPORT/SS_PB

DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT
UJ = ESTIMATED NONDETECT
J = ESTIMATED VALUE
* = DUPLICATE ANALYSIS NOT WITHIN CONTROL LIMITS
+ = FIELD SCREENING RESULT
0U = NOT DETECTED; DETECTION LIMIT NOT AVAILABLE

0 75 150 225 300
SCALE IN FEET

FIGURE 4.1-3

LEAD IN SURFACE SOIL (mg/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

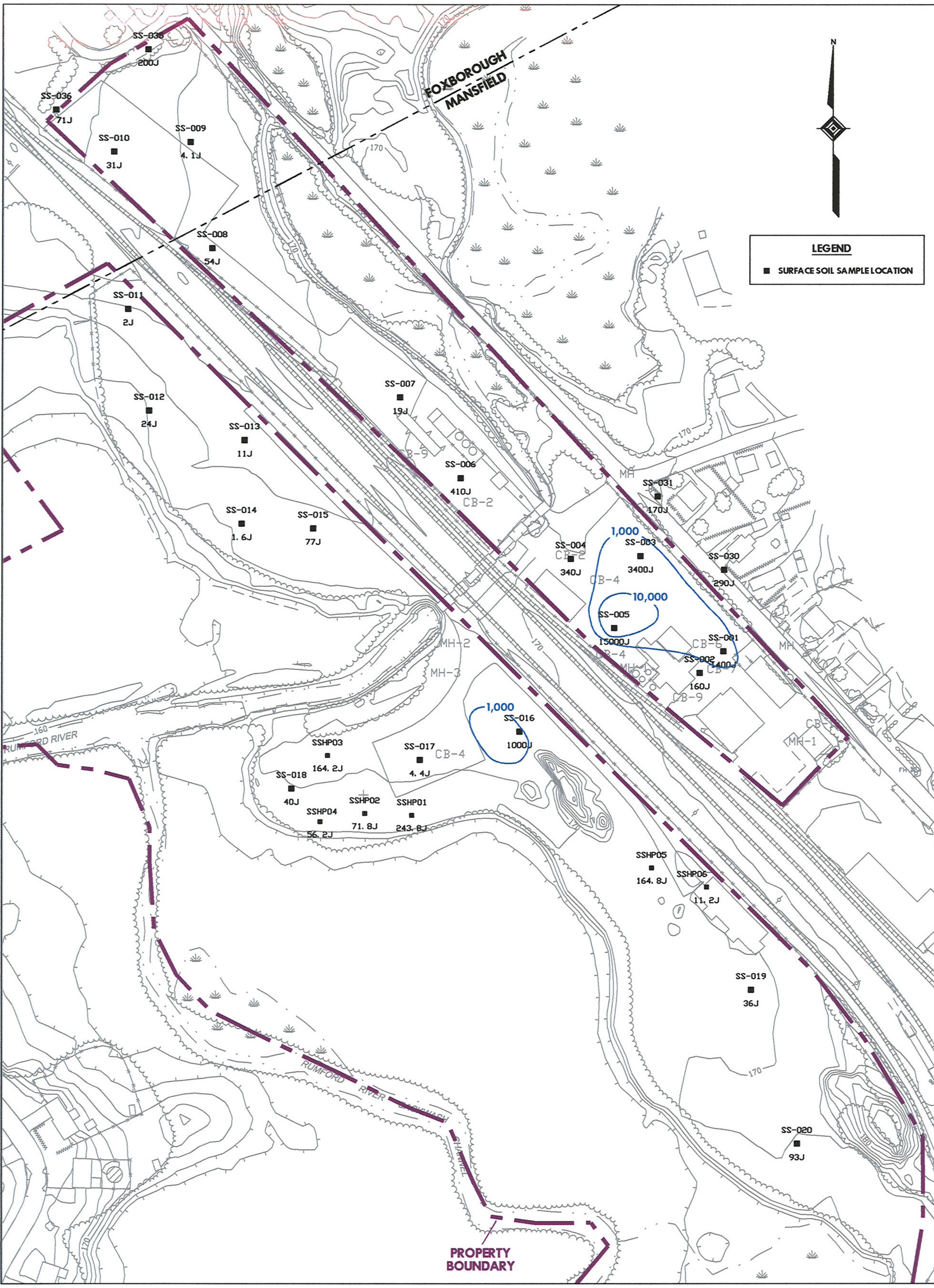
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



FILE: T:\E_CAD\02136\Hatheway\RI\RI REPORT\SS_DIOXIN.dwg

DATA QUALIFIERS:

J = ESTIMATED VALUE

0 75 150 225 300

SCALE IN FEET

FIGURE 4.1-4

DIOXIN IN SURFACE SOIL (ng/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

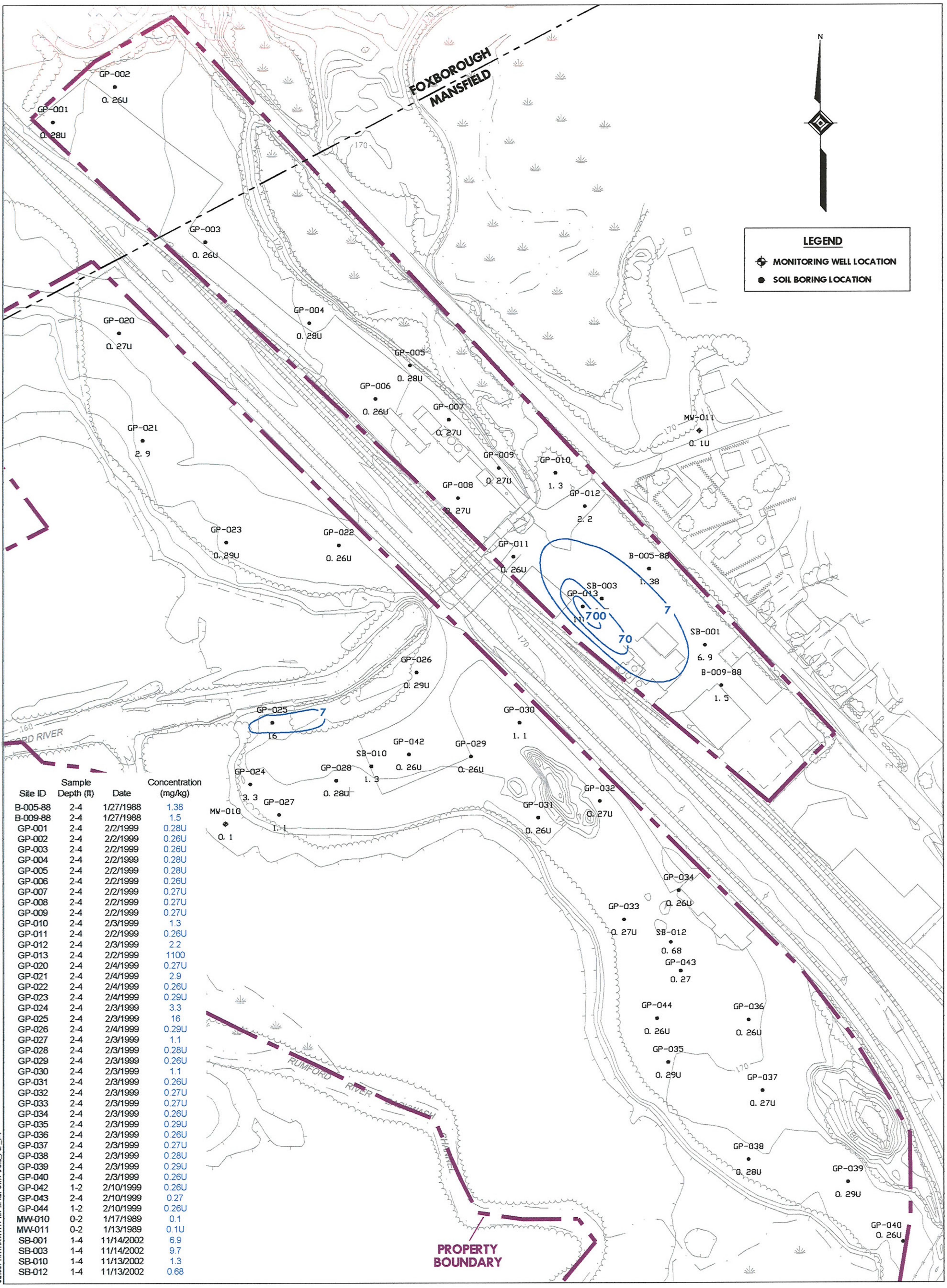
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



Site ID	Sample Depth (ft)	Date	Concentration (mg/kg)
B-005-88	2-4	1/27/1988	1.38
B-009-88	2-4	1/27/1988	1.5
GP-001	2-4	2/2/1999	0.28U
GP-002	2-4	2/2/1999	0.26U
GP-003	2-4	2/2/1999	0.26U
GP-004	2-4	2/2/1999	0.28U
GP-005	2-4	2/2/1999	0.28U
GP-006	2-4	2/2/1999	0.26U
GP-007	2-4	2/2/1999	0.27U
GP-008	2-4	2/2/1999	0.27U
GP-009	2-4	2/2/1999	0.27U
GP-010	2-4	2/3/1999	1.3
GP-011	2-4	2/2/1999	0.26U
GP-012	2-4	2/3/1999	2.2
GP-013	2-4	2/2/1999	1100
GP-020	2-4	2/4/1999	0.27U
GP-021	2-4	2/4/1999	2.9
GP-022	2-4	2/4/1999	0.26U
GP-023	2-4	2/4/1999	0.29U
GP-024	2-4	2/3/1999	3.3
GP-025	2-4	2/3/1999	16
GP-026	2-4	2/4/1999	0.29U
GP-027	2-4	2/3/1999	1.1
GP-028	2-4	2/3/1999	0.28U
GP-029	2-4	2/3/1999	0.26U
GP-030	2-4	2/3/1999	1.1
GP-031	2-4	2/3/1999	0.26U
GP-032	2-4	2/3/1999	0.27U
GP-033	2-4	2/3/1999	0.27U
GP-034	2-4	2/3/1999	0.26U
GP-035	2-4	2/3/1999	0.29U
GP-036	2-4	2/3/1999	0.26U
GP-037	2-4	2/3/1999	0.27U
GP-038	2-4	2/3/1999	0.28U
GP-039	2-4	2/3/1999	0.29U
GP-040	2-4	2/3/1999	0.26U
GP-042	1-2	2/10/1999	0.26U
GP-043	2-4	2/10/1999	0.27
GP-044	1-2	2/10/1999	0.26U
MW-010	0-2	1/17/1989	0.1
MW-011	0-2	1/13/1989	0.1U
SB-001	1-4	11/14/2002	6.9
SB-003	1-4	11/14/2002	9.7
SB-010	1-4	11/13/2002	1.3
SB-012	1-4	11/13/2002	0.68

DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT

0 75 150 225 300

SCALE IN FEET

FIGURE 4.1-5

PCP IN SUBSURFACE SOIL (1'-4') (mg/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

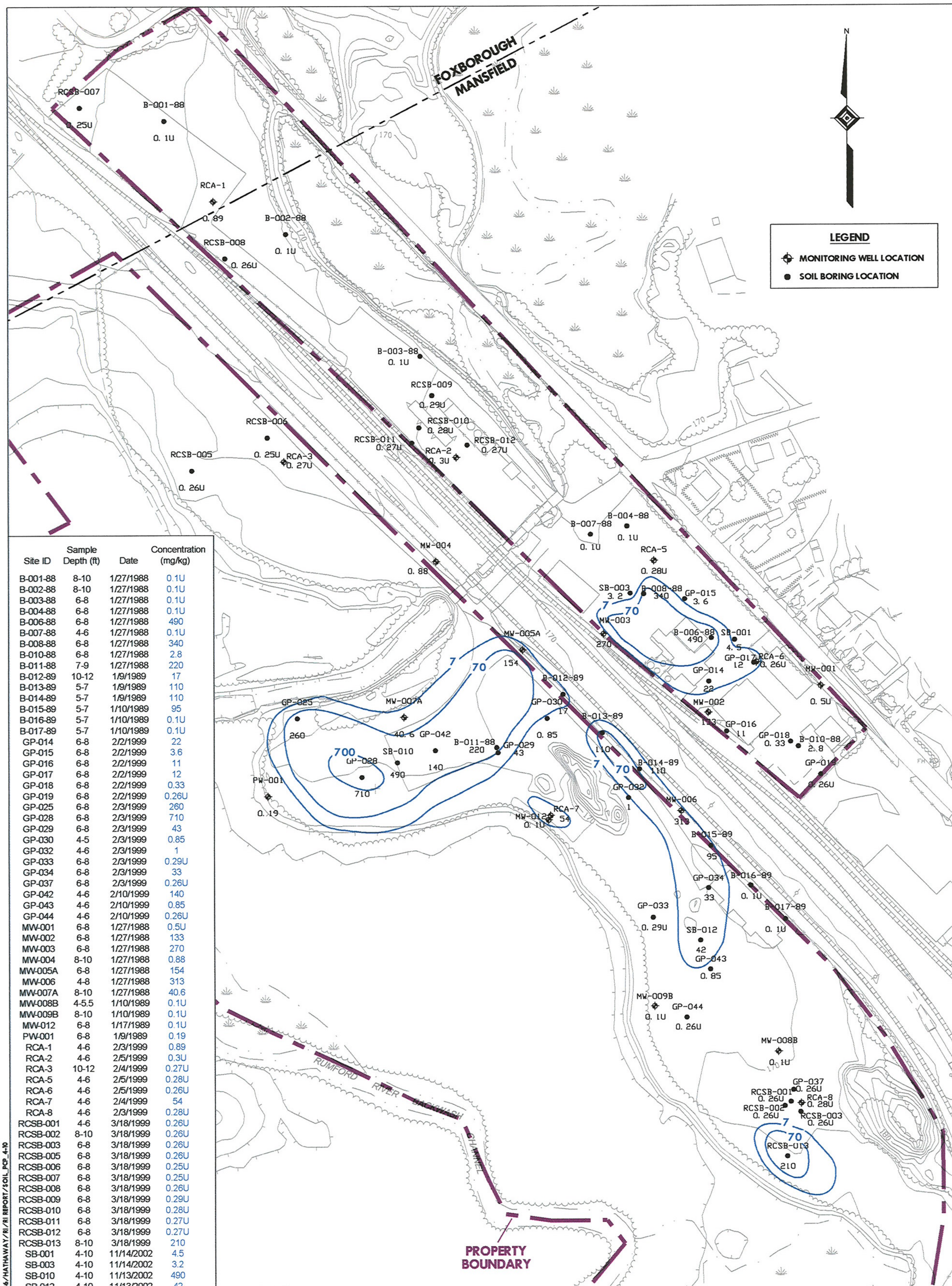
Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



Site ID	Sample Depth (ft)	Date	Concentration (mg/kg)
B-001-88	8-10	1/27/1988	0.1U
B-002-88	8-10	1/27/1988	0.1U
B-003-88	6-8	1/27/1988	0.1U
B-004-88	6-8	1/27/1988	0.1U
B-006-88	6-8	1/27/1988	490
B-007-88	4-6	1/27/1988	0.1U
B-008-88	6-8	1/27/1988	340
B-010-88	6-8	1/27/1988	2.8
B-011-88	7-9	1/27/1988	220
B-012-89	10-12	1/9/1989	17
B-013-89	5-7	1/9/1989	110
B-014-89	5-7	1/9/1989	110
B-015-89	5-7	1/10/1989	95
B-016-89	5-7	1/10/1989	0.1U
B-017-89	5-7	1/10/1989	0.1U
GP-014	6-8	2/2/1999	22
GP-015	6-8	2/2/1999	3.6
GP-016	6-8	2/2/1999	11
GP-017	6-8	2/2/1999	12
GP-018	6-8	2/2/1999	0.33
GP-019	6-8	2/2/1999	0.26U
GP-025	6-8	2/3/1999	260
GP-028	6-8	2/3/1999	710
GP-029	6-8	2/3/1999	43
GP-030	4-5	2/3/1999	0.85
GP-032	4-6	2/3/1999	1
GP-033	6-8	2/3/1999	0.29U
GP-034	6-8	2/3/1999	33
GP-037	6-8	2/3/1999	0.26U
GP-042	4-6	2/10/1999	140
GP-043	4-6	2/10/1999	0.85
GP-044	4-6	2/10/1999	0.26U
MW-001	6-8	1/27/1988	0.5U
MW-002	6-8	1/27/1988	133
MW-003	6-8	1/27/1988	270
MW-004	8-10	1/27/1988	0.88
MW-005A	6-8	1/27/1988	154
MW-006	4-8	1/27/1988	313
MW-007A	8-10	1/27/1988	40.6
MW-008B	4-5.5	1/10/1989	0.1U
MW-009B	8-10	1/10/1989	0.1U
MW-012	6-8	1/17/1989	0.1U
PW-001	6-8	1/9/1989	0.19
RCA-1	4-6	2/3/1999	0.89
RCA-2	4-6	2/5/1999	0.3U
RCA-3	10-12	2/4/1999	0.27U
RCA-5	4-6	2/5/1999	0.28U
RCA-6	4-6	2/5/1999	0.26U
RCA-7	4-6	2/4/1999	54
RCA-8	4-6	2/3/1999	0.28U
RCSB-001	4-6	3/18/1999	0.26U
RCSB-002	8-10	3/18/1999	0.26U
RCSB-003	6-8	3/18/1999	0.26U
RCSB-005	6-8	3/18/1999	0.26U
RCSB-006	6-8	3/18/1999	0.25U
RCSB-007	6-8	3/18/1999	0.25U
RCSB-008	6-8	3/18/1999	0.26U
RCSB-009	6-8	3/18/1999	0.29U
RCSB-010	6-8	3/18/1999	0.28U
RCSB-011	6-8	3/18/1999	0.27U
RCSB-012	6-8	3/18/1999	0.27U
RCSB-013	8-10	3/18/1999	210
SB-001	4-10	11/14/2002	4.5
SB-003	4-10	11/14/2002	3.2
SB-010	4-10	11/13/2002	490
SB-012	4-10	11/13/2002	42

02136/HATHAWAY/RI REPORT/SOIL_PCP_4-10

DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT

0 75 150 225 300

SCALE IN FEET

FIGURE 4.1-6
PCP IN SUBSURFACE SOIL
(4' AND BELOW)
(mg/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

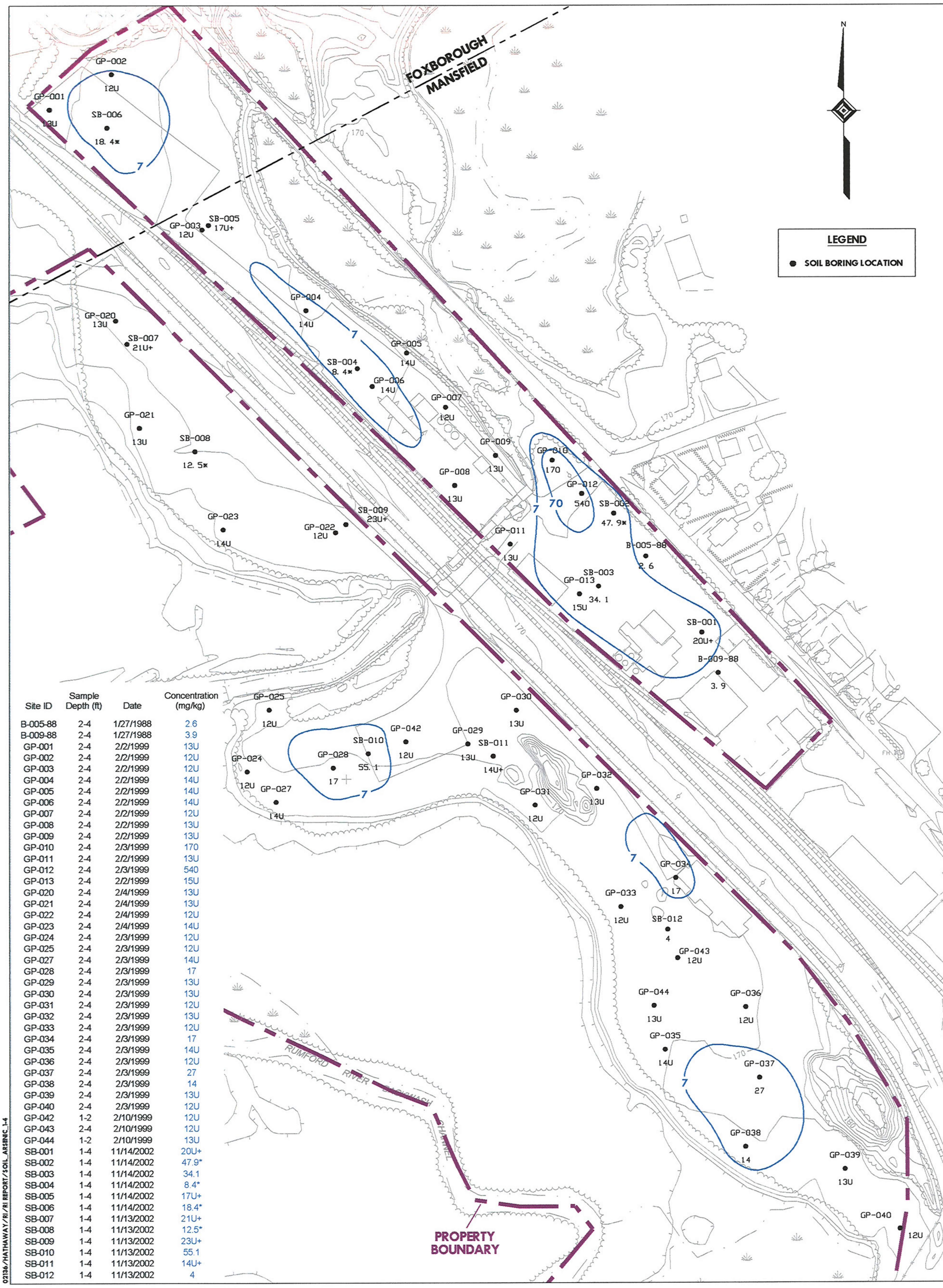
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



Site ID	Sample Depth (ft)	Date	Concentration (mg/kg)
B-005-88	2-4	1/27/1988	2.6
B-009-88	2-4	1/27/1988	3.9
GP-001	2-4	2/2/1999	13U
GP-002	2-4	2/2/1999	12U
GP-003	2-4	2/2/1999	12U
GP-004	2-4	2/2/1999	14U
GP-005	2-4	2/2/1999	14U
GP-006	2-4	2/2/1999	14U
GP-007	2-4	2/2/1999	12U
GP-008	2-4	2/2/1999	13U
GP-009	2-4	2/2/1999	13U
GP-010	2-4	2/3/1999	170
GP-011	2-4	2/2/1999	13U
GP-012	2-4	2/3/1999	540
GP-013	2-4	2/2/1999	15U
GP-020	2-4	2/4/1999	13U
GP-021	2-4	2/4/1999	13U
GP-022	2-4	2/4/1999	12U
GP-023	2-4	2/4/1999	14U
GP-024	2-4	2/3/1999	12U
GP-025	2-4	2/3/1999	12U
GP-027	2-4	2/3/1999	14U
GP-028	2-4	2/3/1999	17
GP-029	2-4	2/3/1999	13U
GP-030	2-4	2/3/1999	13U
GP-031	2-4	2/3/1999	12U
GP-032	2-4	2/3/1999	13U
GP-033	2-4	2/3/1999	12U
GP-034	2-4	2/3/1999	17
GP-035	2-4	2/3/1999	14U
GP-036	2-4	2/3/1999	12U
GP-037	2-4	2/3/1999	27
GP-038	2-4	2/3/1999	14
GP-039	2-4	2/3/1999	13U
GP-040	2-4	2/3/1999	12U
GP-042	1-2	2/10/1999	12U
GP-043	2-4	2/10/1999	12U
GP-044	1-2	2/10/1999	13U
SB-001	1-4	11/14/2002	20U+
SB-002	1-4	11/14/2002	47.9*
SB-003	1-4	11/14/2002	34.1
SB-004	1-4	11/14/2002	8.4*
SB-005	1-4	11/14/2002	17U+
SB-006	1-4	11/14/2002	18.4*
SB-007	1-4	11/13/2002	21U+
SB-008	1-4	11/13/2002	12.5*
SB-009	1-4	11/13/2002	23U+
SB-010	1-4	11/13/2002	55.1
SB-011	1-4	11/13/2002	14U+
SB-012	1-4	11/13/2002	4

02136/HATHAWAY/RI/RI REPORT/SOIL_ARSENIC_1-4

DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT

* = DUPLICATE ANALYSIS NOT WITHIN CONTROL LIMITS

+ = FIELD SCREENING RESULT

0 75 150 225 300

SCALE IN FEET

FIGURE 4.1–7
ARSENIC IN SUBSURFACE SOIL
(1'–4')
(mg/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

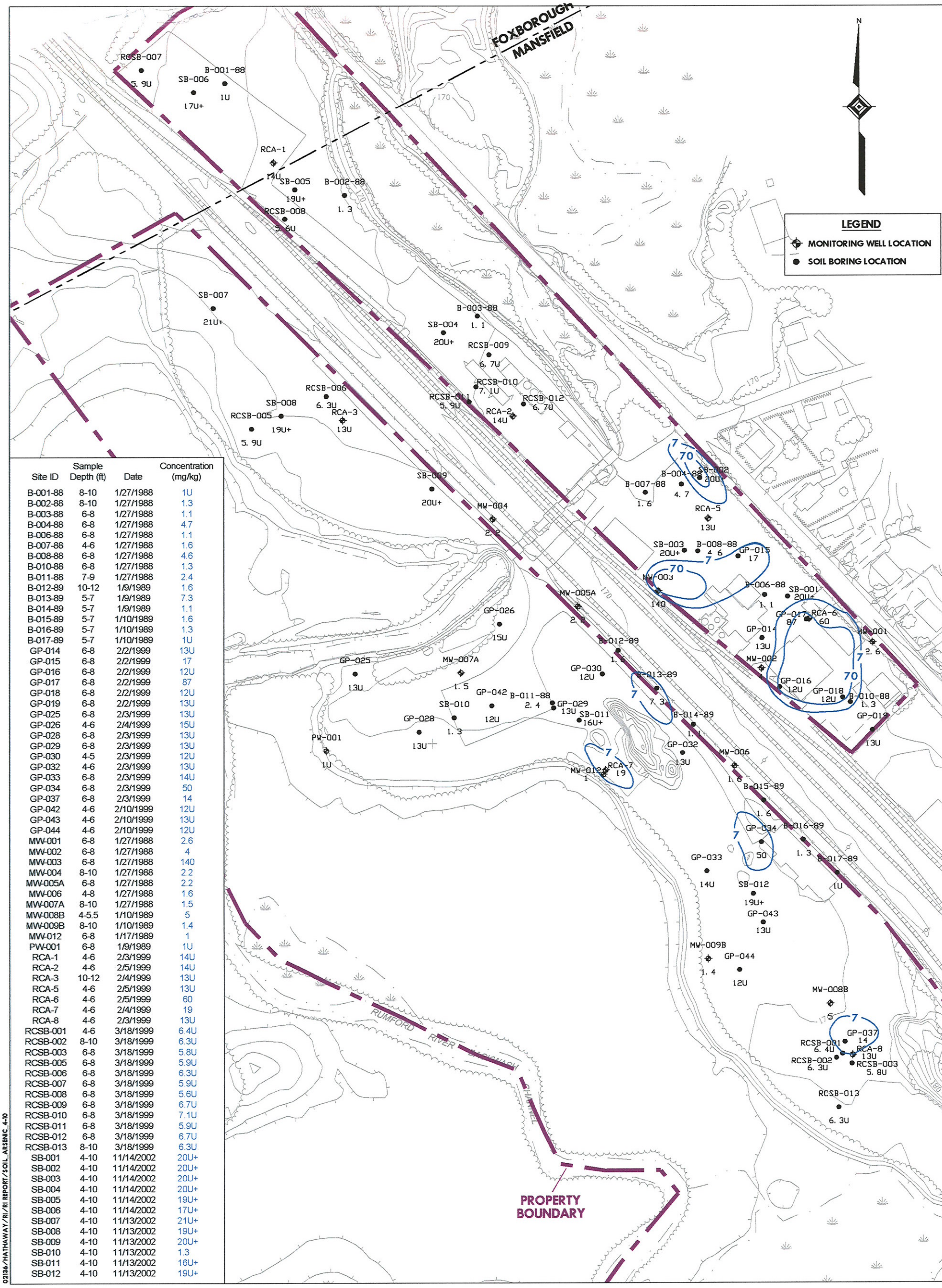
Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



Site ID	Sample Depth (ft)	Date	Concentration (mg/kg)
B-001-88	8-10	1/27/1988	1U
B-002-88	8-10	1/27/1988	1.3
B-003-88	6-8	1/27/1988	1.1
B-004-88	6-8	1/27/1988	4.7
B-006-88	6-8	1/27/1988	1.1
B-007-88	4-6	1/27/1988	1.6
B-008-88	6-8	1/27/1988	4.6
B-010-88	6-8	1/27/1988	1.3
B-011-88	7-9	1/27/1988	2.4
B-012-89	10-12	1/9/1989	1.6
B-013-89	5-7	1/9/1989	7.3
B-014-89	5-7	1/9/1989	1.1
B-015-89	5-7	1/10/1989	1.6
B-016-89	5-7	1/10/1989	1.3
B-017-89	5-7	1/10/1989	1U
GP-014	6-8	2/2/1999	13U
GP-015	6-8	2/2/1999	17
GP-016	6-8	2/2/1999	12U
GP-017	6-8	2/2/1999	87
GP-018	6-8	2/2/1999	12U
GP-019	6-8	2/2/1999	13U
GP-025	6-8	2/3/1999	13U
GP-026	4-6	2/4/1999	15U
GP-028	6-8	2/3/1999	13U
GP-029	6-8	2/3/1999	13U
GP-030	4-5	2/3/1999	12U
GP-032	4-6	2/3/1999	13U
GP-033	6-8	2/3/1999	14U
GP-034	6-8	2/3/1999	50
GP-037	6-8	2/3/1999	14
GP-042	4-6	2/10/1999	12U
GP-043	4-6	2/10/1999	13U
GP-044	4-6	2/10/1999	12U
MW-001	6-8	1/27/1988	2.6
MW-002	6-8	1/27/1988	4
MW-003	6-8	1/27/1988	140
MW-004	8-10	1/27/1988	2.2
MW-005A	6-8	1/27/1988	2.2
MW-006	4-8	1/27/1988	1.6
MW-007A	8-10	1/27/1988	1.5
MW-008B	4-5.5	1/10/1989	5
MW-009B	8-10	1/10/1989	1.4
MW-012	6-8	1/17/1989	1
PW-001	6-8	1/9/1989	1U
RCA-1	4-6	2/3/1999	14U
RCA-2	4-6	2/5/1999	14U
RCA-3	10-12	2/4/1999	13U
RCA-5	4-6	2/5/1999	13U
RCA-6	4-6	2/5/1999	60
RCA-7	4-6	2/4/1999	19
RCA-8	4-6	2/3/1999	13U
RCSB-001	4-6	3/18/1999	6.4U
RCSB-002	8-10	3/18/1999	6.3U
RCSB-003	6-8	3/18/1999	5.8U
RCSB-005	6-8	3/18/1999	5.9U
RCSB-006	6-8	3/18/1999	6.3U
RCSB-007	6-8	3/18/1999	5.9U
RCSB-008	6-8	3/18/1999	5.6U
RCSB-009	6-8	3/18/1999	6.7U
RCSB-010	6-8	3/18/1999	7.1U
RCSB-011	6-8	3/18/1999	5.9U
RCSB-012	6-8	3/18/1999	6.7U
RCSB-013	8-10	3/18/1999	6.3U
SB-001	4-10	11/14/2002	20U+
SB-002	4-10	11/14/2002	20U+
SB-003	4-10	11/14/2002	20U+
SB-004	4-10	11/14/2002	20U+
SB-005	4-10	11/14/2002	19U+
SB-006	4-10	11/14/2002	17U+
SB-007	4-10	11/13/2002	21U+
SB-008	4-10	11/13/2002	19U+
SB-009	4-10	11/13/2002	20U+
SB-010	4-10	11/13/2002	1.3
SB-011	4-10	11/13/2002	16U+
SB-012	4-10	11/13/2002	19U+

02136/HATHAWAY/RI/RI REPORT/SOIL_ARSENIC_4-10

DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT

+ = FIELD SCREENING RESULT

0 75 150 225 300

SCALE IN FEET

FIGURE 4.1–8

ARSENIC IN SUBSURFACE SOIL (4' AND BELOW) (mg/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

TRC

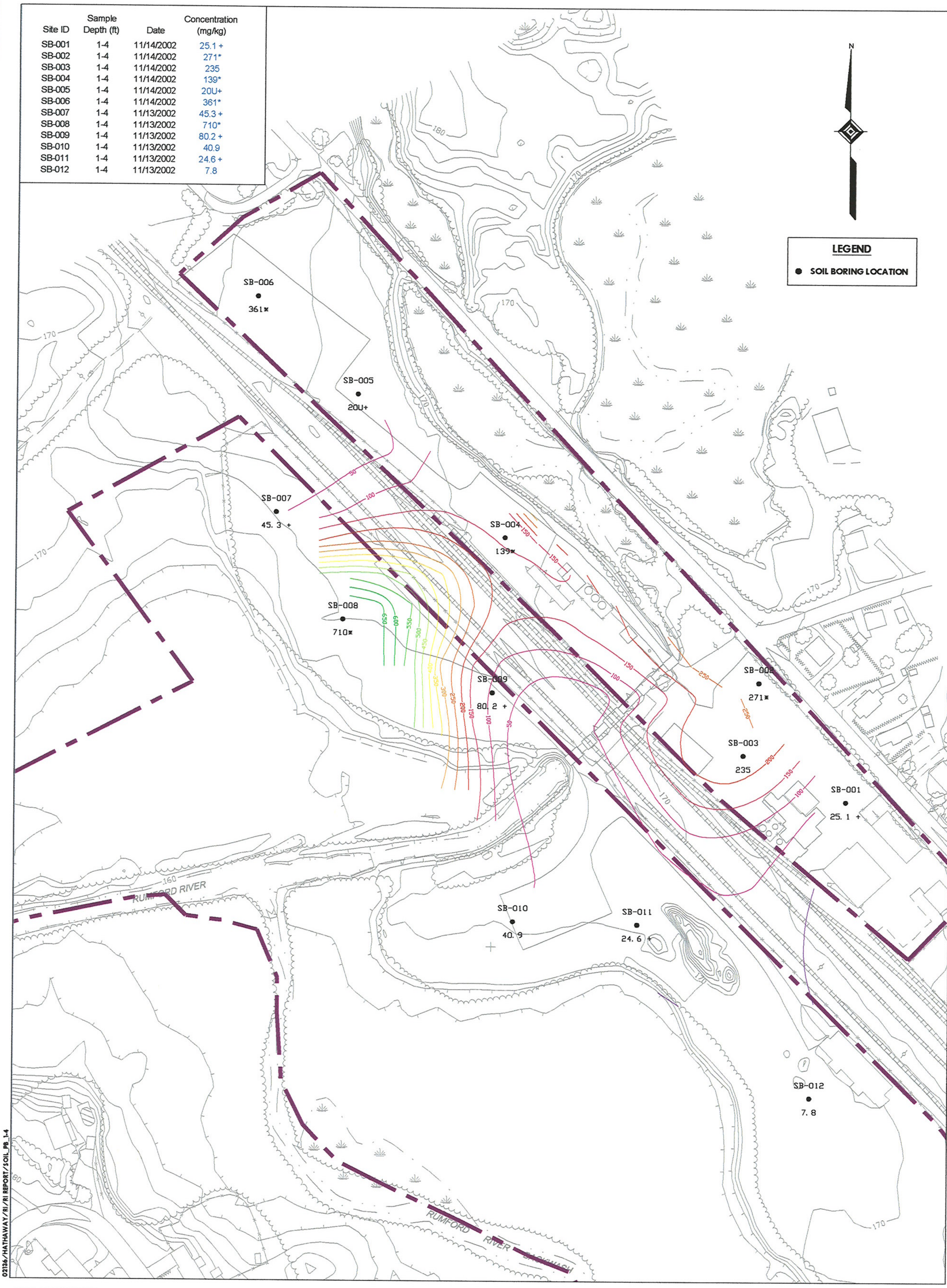
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

Site ID	Sample Depth (ft)	Date	Concentration (mg/kg)
SB-001	1-4	11/14/2002	25.1 +
SB-002	1-4	11/14/2002	271*
SB-003	1-4	11/14/2002	235
SB-004	1-4	11/14/2002	139*
SB-005	1-4	11/14/2002	20U+
SB-006	1-4	11/14/2002	361*
SB-007	1-4	11/13/2002	45.3 +
SB-008	1-4	11/13/2002	710*
SB-009	1-4	11/13/2002	80.2 +
SB-010	1-4	11/13/2002	40.9
SB-011	1-4	11/13/2002	24.6 +
SB-012	1-4	11/13/2002	7.8



02136/HATHAWAY/RI REPORT/SOIL_PB_1-4

DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT

* = DUPLICATE ANALYSIS NOT WITHIN CONTROL LIMITS

+ = FIELD SCREENING RESULT

0 75 150 225 300

SCALE IN FEET

FIGURE 4.1-9
LEAD IN SUBSURFACE SOIL
(1'-4')
(mg/kg)
HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC

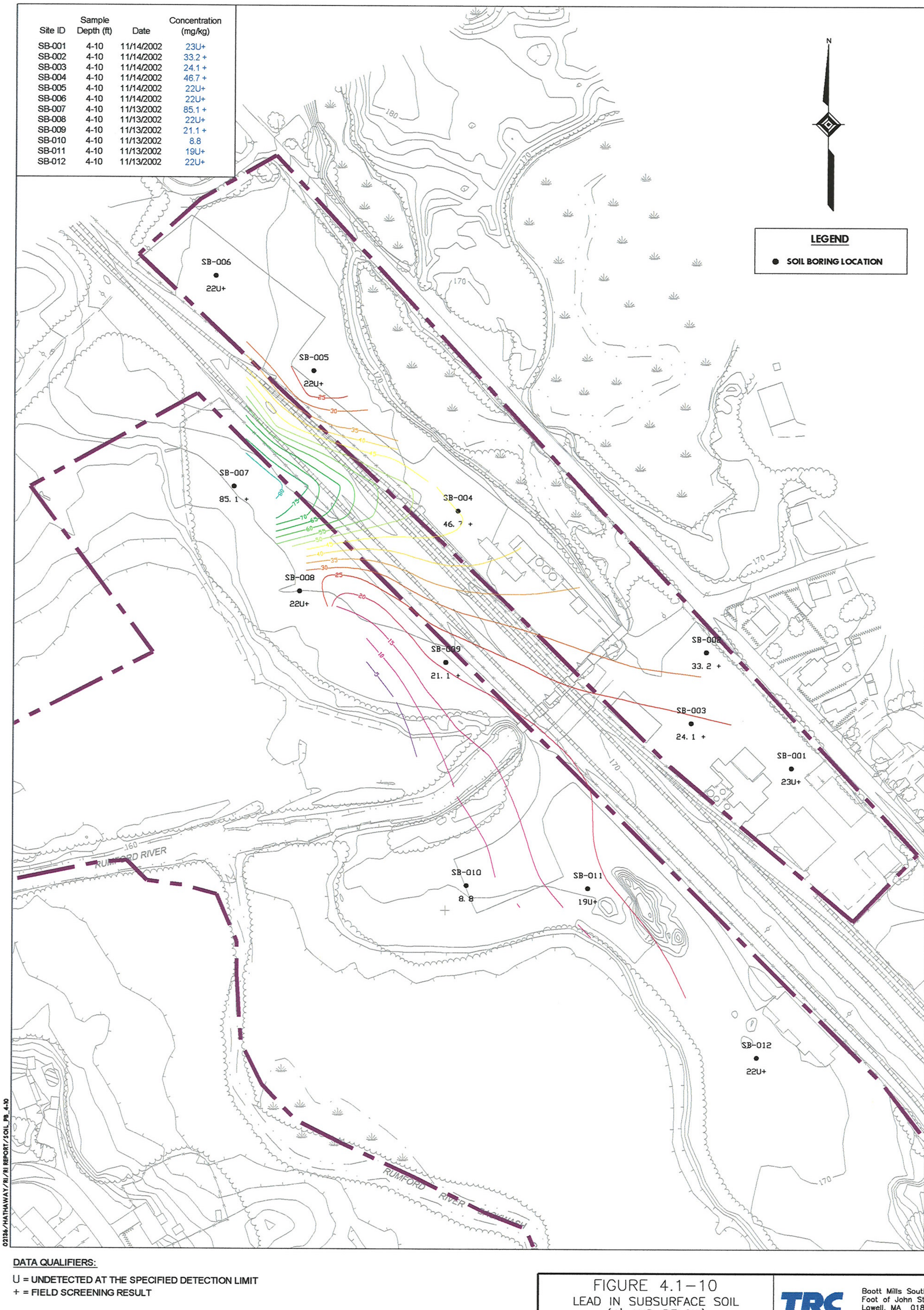
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

Site ID	Sample Depth (ft)	Date	Concentration (mg/kg)
SB-001	4-10	11/14/2002	23U+
SB-002	4-10	11/14/2002	33.2 +
SB-003	4-10	11/14/2002	24.1 +
SB-004	4-10	11/14/2002	46.7 +
SB-005	4-10	11/14/2002	22U+
SB-006	4-10	11/14/2002	22U+
SB-007	4-10	11/13/2002	85.1 +
SB-008	4-10	11/13/2002	22U+
SB-009	4-10	11/13/2002	21.1 +
SB-010	4-10	11/13/2002	8.8
SB-011	4-10	11/13/2002	19U+
SB-012	4-10	11/13/2002	22U+



DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT
+ = FIELD SCREENING RESULT

0 75 150 225 300

SCALE IN FEET

FIGURE 4.1-10
LEAD IN SUBSURFACE SOIL
(4' AND BELOW)
(mg/kg)
HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

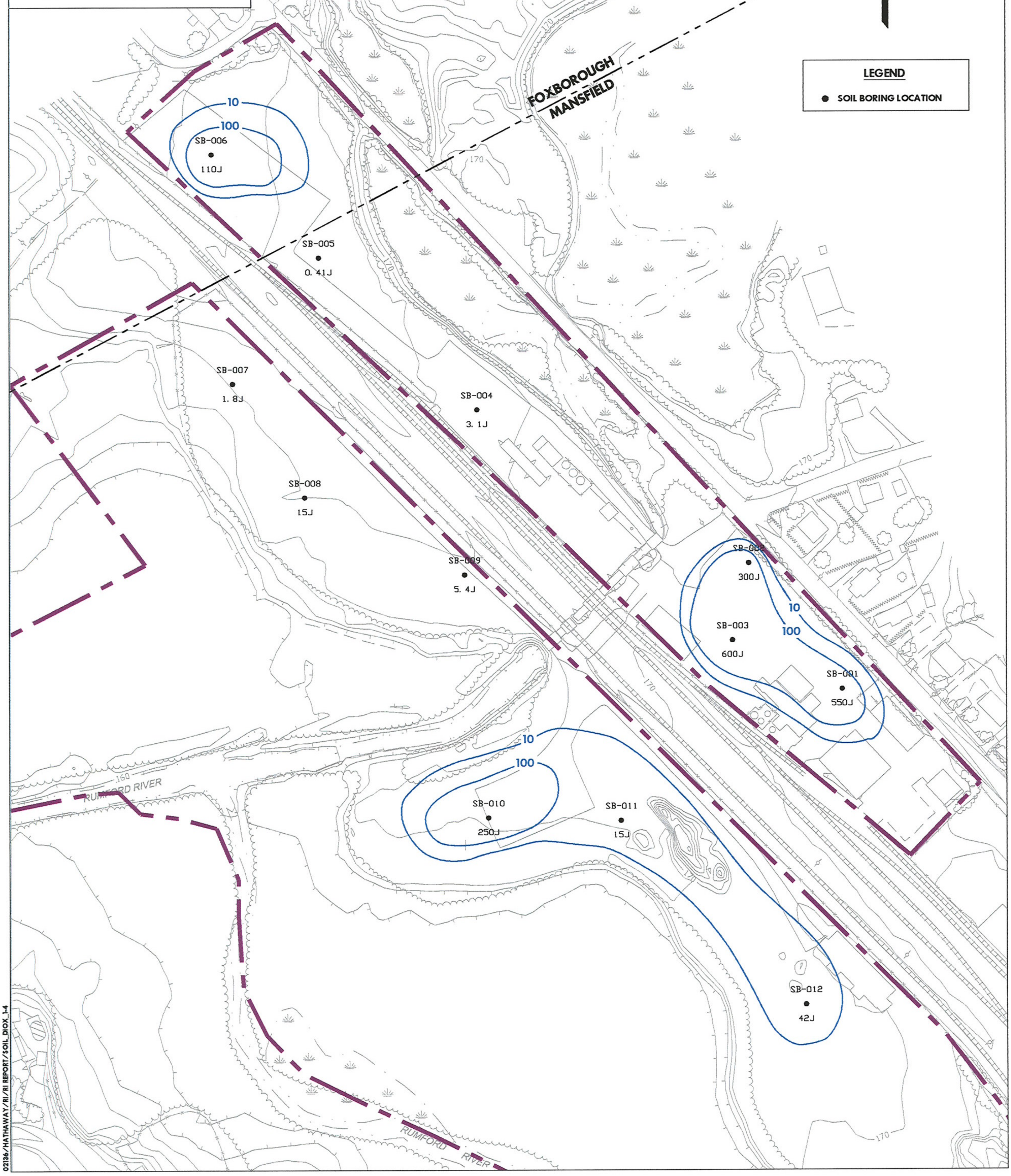
TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

Site ID	Sample Depth (ft)	Date	Concentration (ng/kg)
SB-001	1-4	11/14/2002	550J
SB-002	1-4	11/14/2002	300J
SB-003	1-4	11/14/2002	600J
SB-004	1-4	11/14/2002	3.1J
SB-005	1-4	11/14/2002	0.41J
SB-006	1-4	11/14/2002	110J
SB-007	1-4	11/13/2002	1.8J
SB-008	1-4	11/13/2002	15J
SB-009	1-4	11/13/2002	5.4J
SB-010	1-4	11/13/2002	250J
SB-011	1-4	11/13/2002	15J
SB-012	1-4	11/13/2002	42J



DATA QUALIFIERS:
J = ESTIMATED VALUE

0 75 150 225 300
SCALE IN FEET

FIGURE 4.1-11
DIOXIN IN SUBSURFACE SOIL
(1'-4')
(ng/kg)
HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

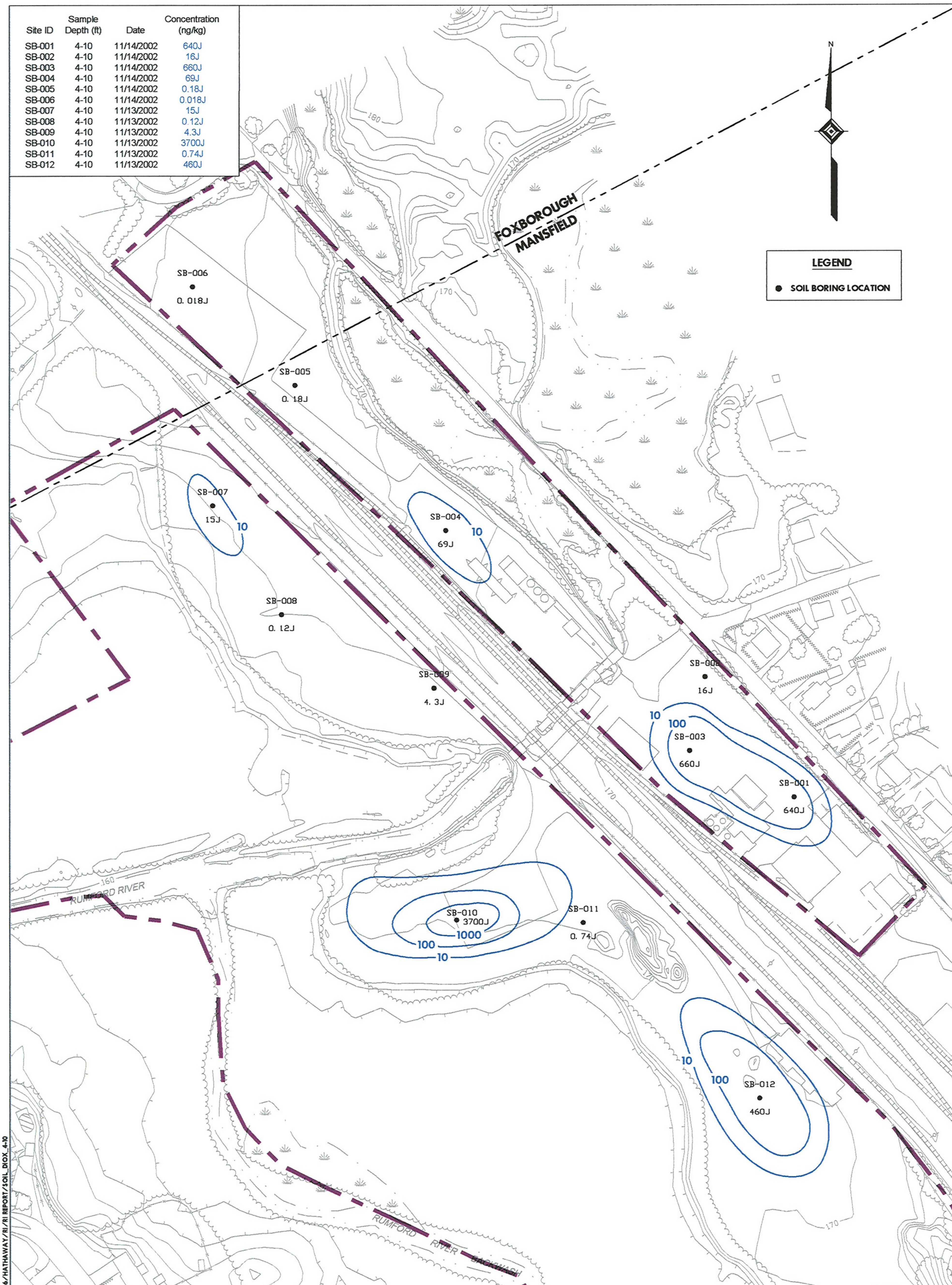
TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

Site ID	Sample Depth (ft)	Date	Concentration (ng/kg)
SB-001	4-10	11/14/2002	640J
SB-002	4-10	11/14/2002	16J
SB-003	4-10	11/14/2002	660J
SB-004	4-10	11/14/2002	69J
SB-005	4-10	11/14/2002	0.18J
SB-006	4-10	11/14/2002	0.018J
SB-007	4-10	11/13/2002	15J
SB-008	4-10	11/13/2002	0.12J
SB-009	4-10	11/13/2002	4.3J
SB-010	4-10	11/13/2002	3700J
SB-011	4-10	11/13/2002	0.74J
SB-012	4-10	11/13/2002	460J



DATA QUALIFIERS:
J = ESTIMATED VALUE

0 75 150 225 300
SCALE IN FEET

FIGURE 4.1-12
DIOXIN IN SUBSURFACE SOIL
(4' AND BELOW)
(ng/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

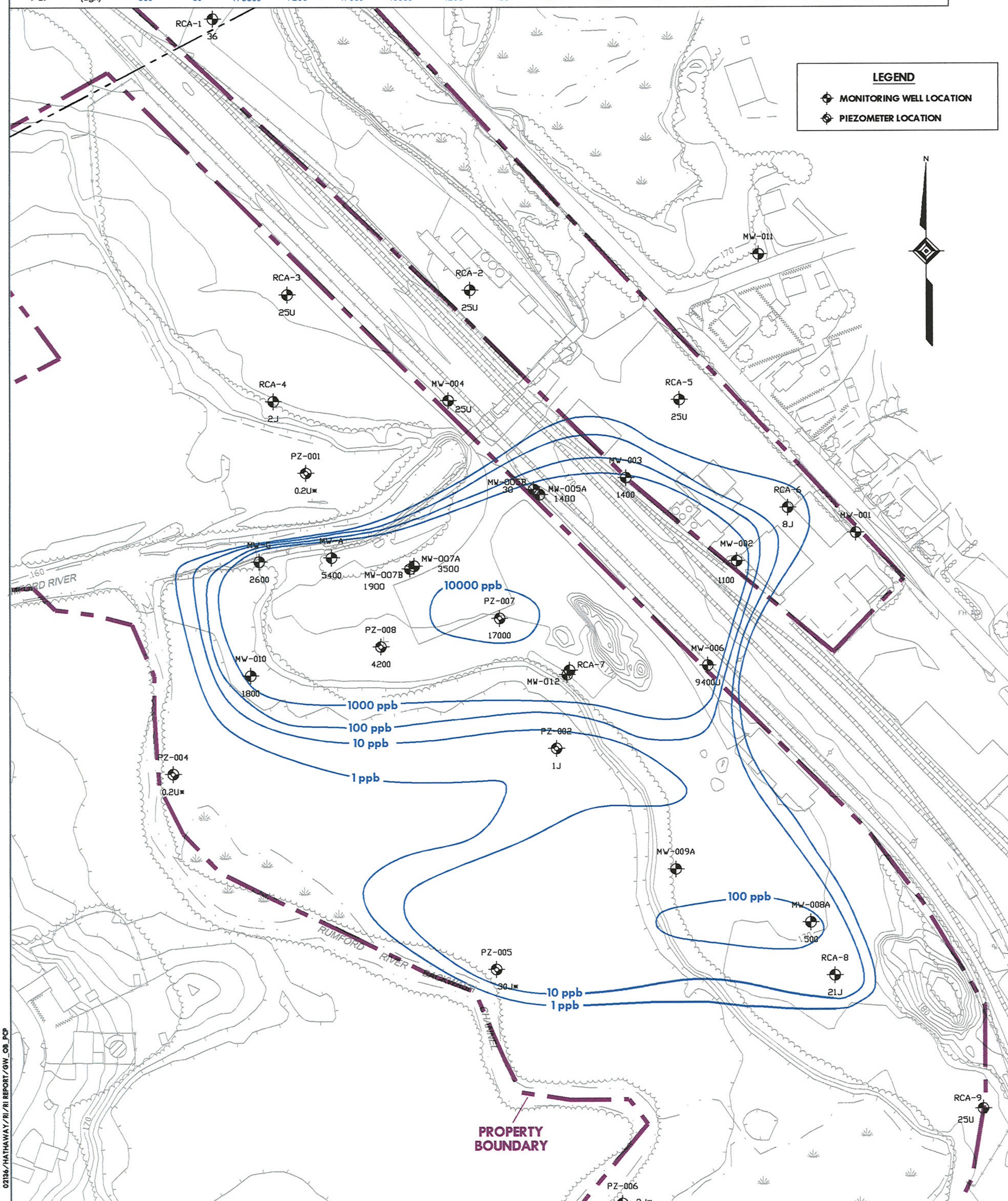
TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39
EPA CONTRACT NO.: 68-W6-0042
RAC SUBCONTRACT NO.: 107061

CONSTITUENT	UNITS	MW-002	MW-002	MW-002	MW-003	MW-003	MW-004	MW-004	MW-005A	MW-005A	MW-005A	MW-005B	MW-005B	MW-006	MW-006	MW-007A	MW-007A
		D01856	D04390	D04419	D01857	D04391	D01858	A18N2	D01859	D01860	D04393	D01861	A18N4	D01862	A18N5	D01863	D04396
		11/19/2001	12/10/2003	12/10/2003	11/16/2001	12/11/2003	11/13/2001	12/12/2003	11/15/2001	11/15/2001	12/15/2003	11/14/2001	12/11/2003	11/15/2001	12/16/2003	11/15/2001	12/16/2003
		Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Turbidity	(ntu)	0.5	1.94	1.94	0	0	1.04	0.71	0	0	0	4.82	0.41	1.02	3.47	1.54	7.2
PCP	(ug/l)	3500J	980	1100	400J	1400	0.28J	25U	1800J	1800J	1400	26	30	5500J	9400J	5100J	3500

CONSTITUENT	UNITS	MW-007B	MW-007B	MW-008A	MW-008A	MW-009A	MW-010	MW-010	MW-011	MW-012	MW-A	MW-G	MW-G	PZ-001	PZ-002	PZ-002	PZ-004
		D02002	D04397	D01864	A18N8	D01866	D01868	A18P1	D01869	D01870	A18P5	A18P6	D04406	D03559	D03560	A18P7	D03563
		11/15/2001	12/16/2003	11/13/2001	12/18/2003	11/16/2001	11/14/2001	12/16/2003	11/16/2001	11/19/2001	12/15/2003	12/12/2003	12/12/2003	12/11/2002	12/11/2002	12/13/2003	12/12/2002
		Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Turbidity	(ntu)	11.3	3.1	0.26	4.2	0	2.85	31.8	4.32	0.52	4.6	0	0	0	37	4.82	3.10
PCP	(ug/l)	2600J	1900	3700J	500	20	2700J	1800	10UJ	3100J	5400	2600	2200	0.2U	4.8J	1J	0.2U

CONSTITUENT	UNITS	PZ-005	PZ-006	PZ-007	PZ-007	PZ-008	PZ-008	PZ-008	RCA-1	RCA-2	RCA-3	RCA-4	RCA-5	RCA-6	RCA-8	RCA-9
		D03564	D03565	D03566	D04408	D03562	D03561	A18P9	A18Q0	A18Q1	A18Q2	A18Q3	A18Q4	A18Q5	A18Q7	A18Q8
		12/12/2002	12/12/2002	12/11/2002	12/15/2003	12/10/2002	12/10/2002	12/16/2003	12/11/2003	12/11/2003	12/12/2003	12/12/2003	12/10/2003	12/10/2003	12/18/2003	12/18/2003
		Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Turbidity	(ntu)	4.50	4.10	1.1	6.96	2.4	2.4	3.1	1.1	0.3	4.4	2.71	1.9	1	3.9	3.9
PCP	(ug/l)	30J	3J	17000J	7200	4700J	4600J	4200	36	25U	25U	2J	25U	8J	21J	25U



NOTE:
DECEMBER 2003 VALUES ARE CONTOURED

DATA QUALIFIERS:
U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT
J = ESTIMATED VALUE
* = RESULT FROM DECEMBER 2002 SAMPLING. WELL NOT SAMPLED DURING DECEMBER 2003 SAMPLING ROUND.

0 75 150 225 300
SCALE IN FEET

FIGURE 4.2-1
PCP IN OVERBURDEN GROUND WATER (ug/L) (MAXIMUM OBSERVED)
HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

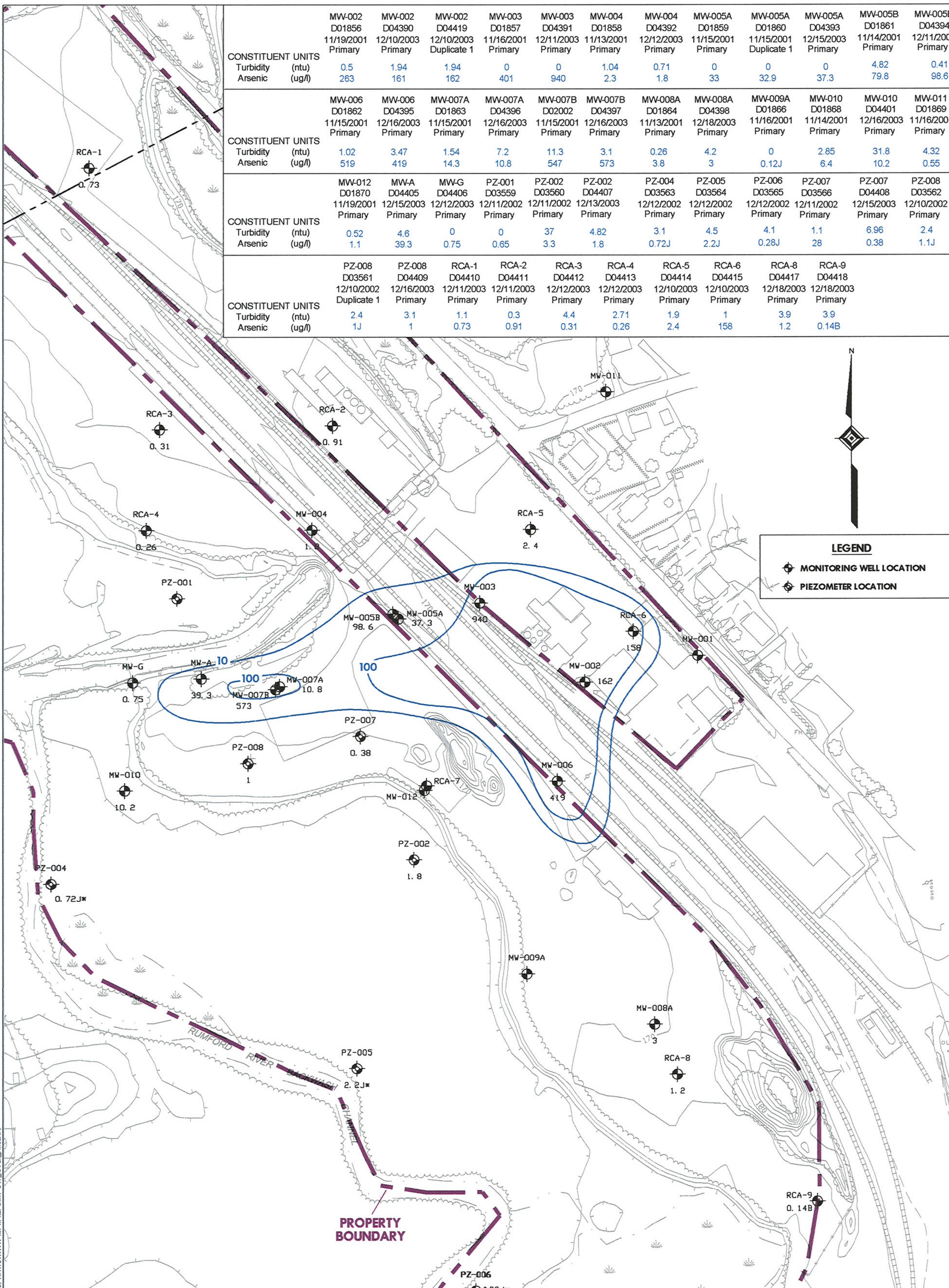
TRC PROJ. NO.: 02136-0490-01X39
EPA CONTRACT NO.: 68-W6-0042
RAC SUBCONTRACT NO.: 107061

CONSTITUENT	UNITS	MW-002 D01856 11/19/2001 Primary	MW-002 D04390 12/10/2003 Primary	MW-002 D04419 12/10/2003 Duplicate 1	MW-003 D01857 11/16/2001 Primary	MW-003 D04391 12/11/2003 Primary	MW-004 D01858 11/13/2001 Primary	MW-004 D04392 12/12/2003 Primary	MW-005A D01859 11/15/2001 Primary	MW-005A D01860 11/15/2001 Duplicate 1	MW-005A D04393 12/15/2003 Primary	MW-005B D01861 11/14/2001 Primary	MW-005B D04394 12/11/2003 Primary
Turbidity	(ntu)	0.5	1.94	1.94	0	0	1.04	0.71	0	0	0	4.82	0.41
Arsenic	(ug/l)	263	161	162	401	940	2.3	1.8	33	32.9	37.3	79.8	98.6

CONSTITUENT	UNITS	MW-006 D01862 11/15/2001 Primary	MW-006 D04395 12/16/2003 Primary	MW-007A D01863 11/15/2001 Primary	MW-007A D04396 12/16/2003 Primary	MW-007B D02002 11/15/2001 Primary	MW-007B D04397 12/16/2003 Primary	MW-008A D01864 11/13/2001 Primary	MW-008A D04398 12/18/2003 Primary	MW-009A D01866 11/16/2001 Primary	MW-010 D01868 11/14/2001 Primary	MW-010 D04401 12/16/2003 Primary	MW-011 D01869 11/16/2001 Primary
Turbidity	(ntu)	1.02	3.47	1.54	7.2	11.3	3.1	0.26	4.2	0	2.85	31.8	4.32
Arsenic	(ug/l)	519	419	14.3	10.8	547	573	3.8	3	0.12J	6.4	10.2	0.55

CONSTITUENT	UNITS	MW-012 D01870 11/19/2001 Primary	MW-A D04405 12/15/2003 Primary	MW-G D04406 12/12/2003 Primary	PZ-001 D03559 12/11/2002 Primary	PZ-002 D03560 12/11/2002 Primary	PZ-002 D04407 12/13/2003 Primary	PZ-004 D03563 12/12/2002 Primary	PZ-005 D03564 12/12/2002 Primary	PZ-006 D03565 12/12/2002 Primary	PZ-007 D03566 12/11/2002 Primary	PZ-007 D04408 12/15/2003 Primary	PZ-008 D03562 12/10/2002 Primary
Turbidity	(ntu)	0.52	4.6	0	0	37	4.82	3.1	4.5	4.1	1.1	6.96	2.4
Arsenic	(ug/l)	1.1	39.3	0.75	0.65	3.3	1.8	0.72J	2.2J	0.28J	28	0.38	1.1J

CONSTITUENT	UNITS	PZ-008 D03561 12/10/2002 Duplicate 1	PZ-008 D04409 12/16/2003 Primary	RCA-1 D04410 12/11/2003 Primary	RCA-2 D04411 12/11/2003 Primary	RCA-3 D04412 12/12/2003 Primary	RCA-4 D04413 12/12/2003 Primary	RCA-5 D04414 12/10/2003 Primary	RCA-6 D04415 12/10/2003 Primary	RCA-8 D04417 12/18/2003 Primary	RCA-9 D04418 12/18/2003 Primary
Turbidity	(ntu)	2.4	3.1	1.1	0.3	4.4	2.71	1.9	1	3.9	3.9
Arsenic	(ug/l)	1J	1	0.73	0.91	0.31	0.26	2.4	158	1.2	0.14B



NOTE:
DECEMBER 2003 VALUES ARE CONTOURED

DATA QUALIFIERS:

J = ESTIMATED VALUE

* = RESULT FROM DECEMBER 2002 SAMPLING. WELL NOT SAMPLED DURING DECEMBER 2003 SAMPLING ROUND.

0 75 150 225 300

SCALE IN FEET

FIGURE 4.2-2

ARSENIC IN OVERBURDEN GROUND WATER (ug/L)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC

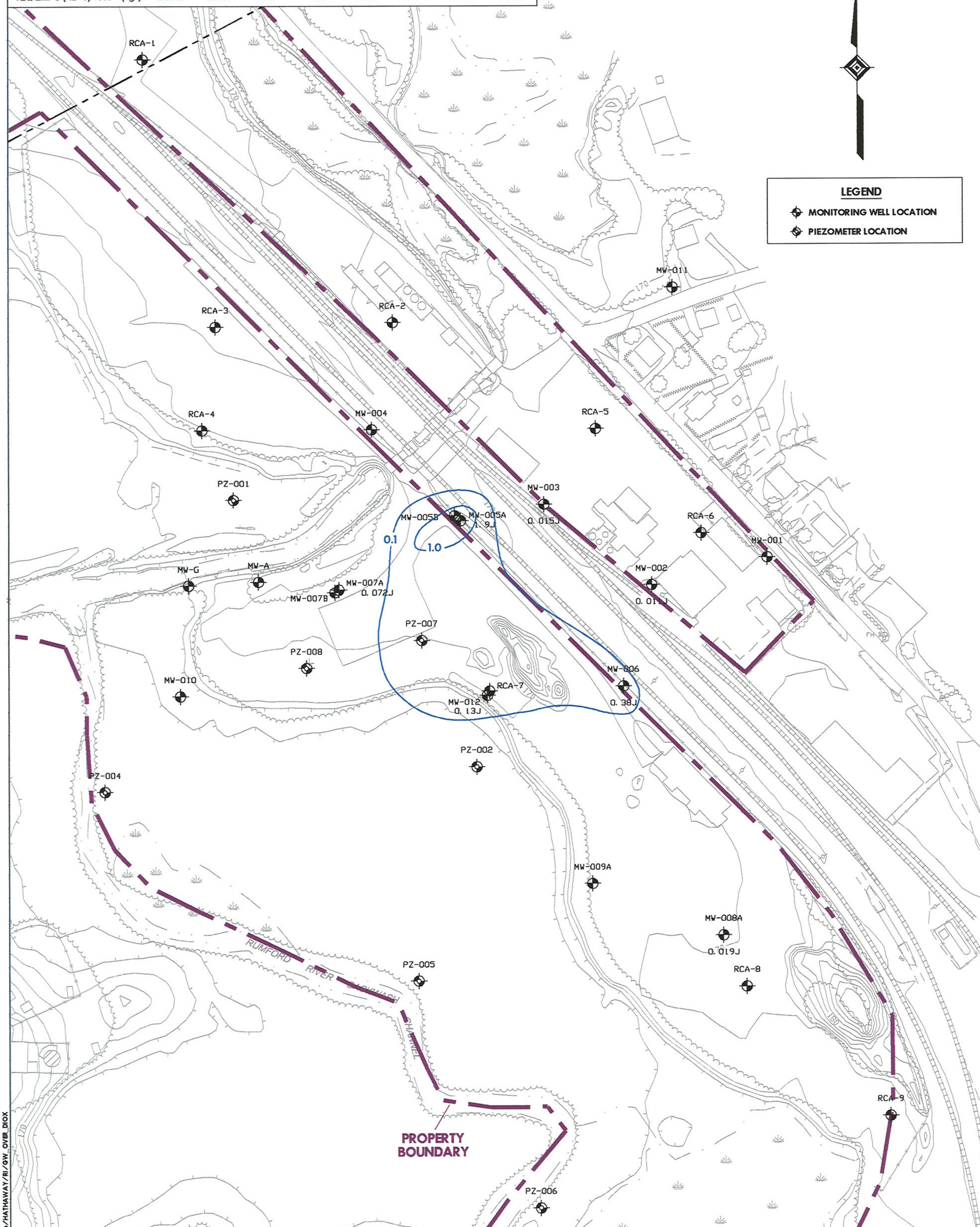
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

CONSTITUENT	UNITS	MW-002 D01856 11/19/2001 Primary	MW-003 D01857 11/16/2001 Primary	MW-005A D01859 11/15/2001 Primary	MW-005A D01860 11/15/2001 Duplicate 1	MW-006 D01862 11/15/2001 Primary	MW-007A D01863 11/15/2001 Primary	MW-008A D01864 11/13/2001 Primary	MW-012 D01870 11/19/2001 Primary
Turbidity	(ntu)	0.5	0	0	0	1.02	1.54	0.26	0.52
TEQ EMPC (ND=0) 1998	(ng/l)	0.011J	0.015J	1.9J	1.8J	0.38J	0.072J	0.019J	0.13J



DATA QUALIFIERS:
J = ESTIMATED VALUE

0 75 150 225 300
SCALE IN FEET

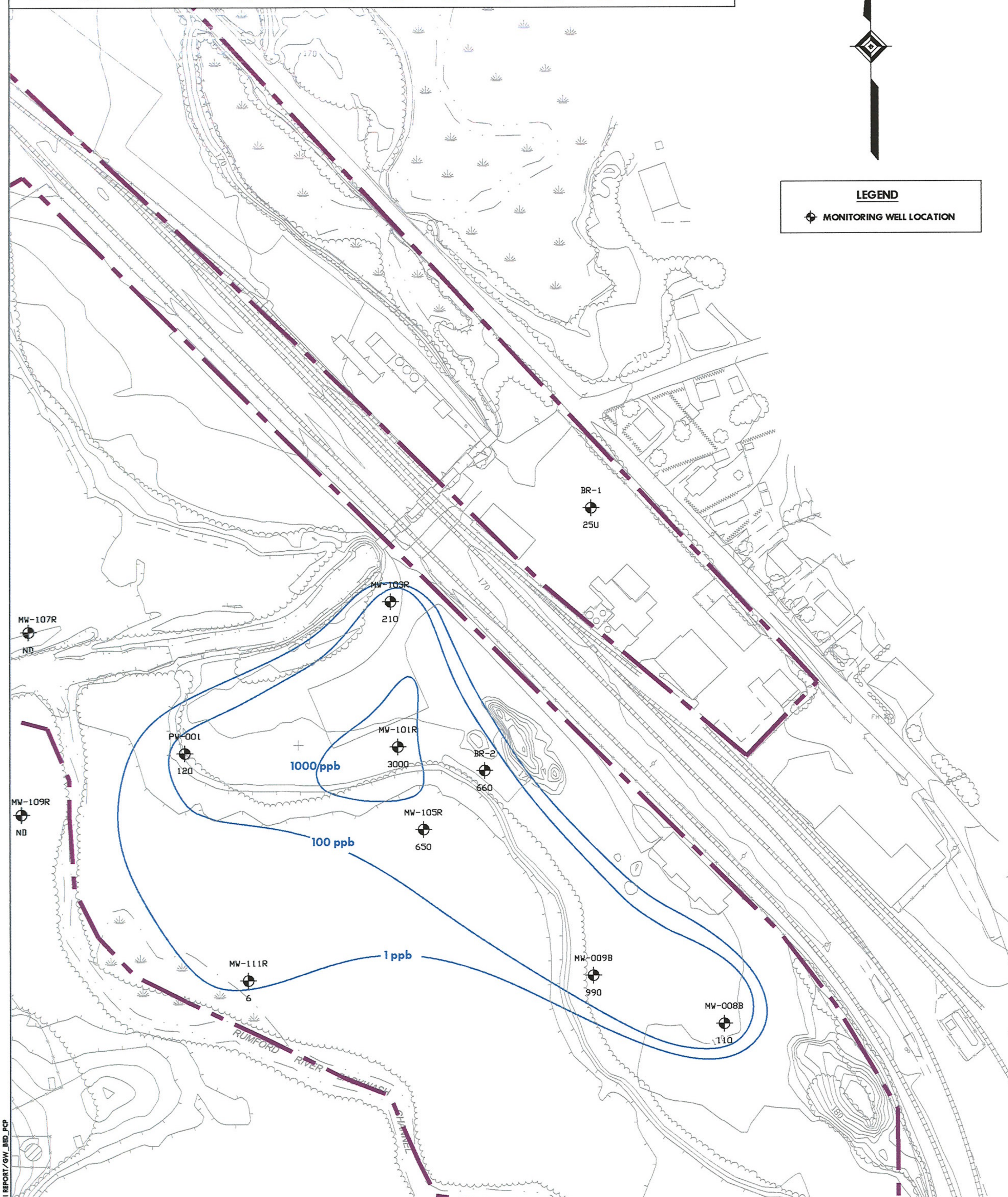
FIGURE 4.2-3
DIOXIN IN OVERBURDEN GROUND WATER (ng/ℓ)
HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39
EPA CONTRACT NO.: 68-W6-0042
RAC SUBCONTRACT NO.: 107061

CONSTITUENT	UNITS	BR-1 A18B7 12/11/2003 Primary	BR-2 D04388 12/17/2003 Primary	MW-008B D01865 11/14/2001 Primary	MW-008B A18N9 12/18/2003 Primary	MW-009B D01867 11/14/2001 Primary	MW-009B D04400 12/17/2003 Primary	MW-009B A18R0 12/17/2003 Duplicate 1	MW-101R D04402 12/15/2003 Primary	MW-101R D04787 4/16/2004 Primary	MW-103R D04403 12/18/2003 Primary	MW-105R A18P4 12/12/2003 Primary	PW-001 D04788 4/15/04 Primary
Turbidity	(ntu)	7.9	9.16	2.16	3.08	4.27	0.75	0.75	52.5	6.3	20	4.8	3.4
PCP	(ug/l)	25U	660	44J	110	460	990	800	3100	2300	210	350	98



02136/HATHAWAY/RI/RI REPORT/GW_BED_PCP

NOTE:
DECEMBER 2003 VALUES ARE CONTOURED

DATA QUALIFIERS:
U = NONDETECTED AT THE SPECIFIED DETECTION LIMIT
J = ESTIMATED VALUE

0 75 150 225 300
SCALE IN FEET

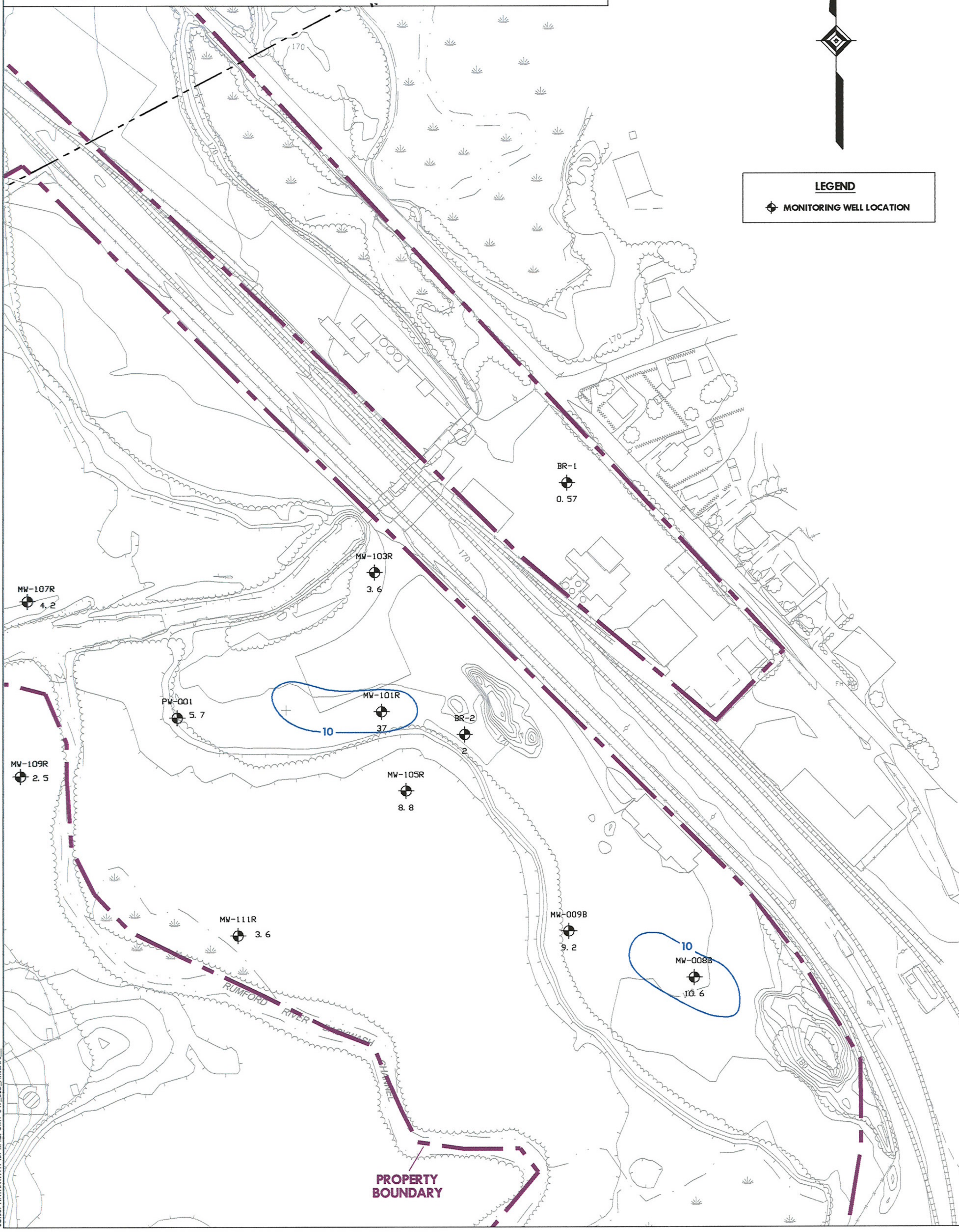
FIGURE 4.2-4
PCP IN BEDROCK GROUND WATER (ug/L) (MAXIMUM OBSERVED)
HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39
EPA CONTRACT NO.: 68-W6-0042
RAC SUBCONTRACT NO.: 107061

CONSTITUENT	UNITS	BR-1 D04387 12/11/2003 Primary	BR-2 D04388 12/17/2003 Primary	MW-008B D01865 11/14/2001 Primary	MW-008B D04399 12/18/2003 Primary	MW-009B D01867 11/14/2001 Primary	MW-009B D04400 12/17/2003 Primary	MW-009B D04420 12/17/2003 Duplicate 1	MW-101R D04402 12/15/2003 Primary	MW-103R D04403 12/18/2003 Primary	MW-105R D04404 12/12/2003 Primary
Turbidity	(ntu)	7.9	9.16	2.16	3.08	4.27	0.75	0.75	52.5	20	4.8
Arsenic	(ug/l)	0.57	2	7.1	10.6	6.1	9.2	9.1	37	3.6	8.8



0 75 150 225 300

SCALE IN FEET

FIGURE 4.2-5

ARSENIC IN BEDROCK GROUND WATER

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

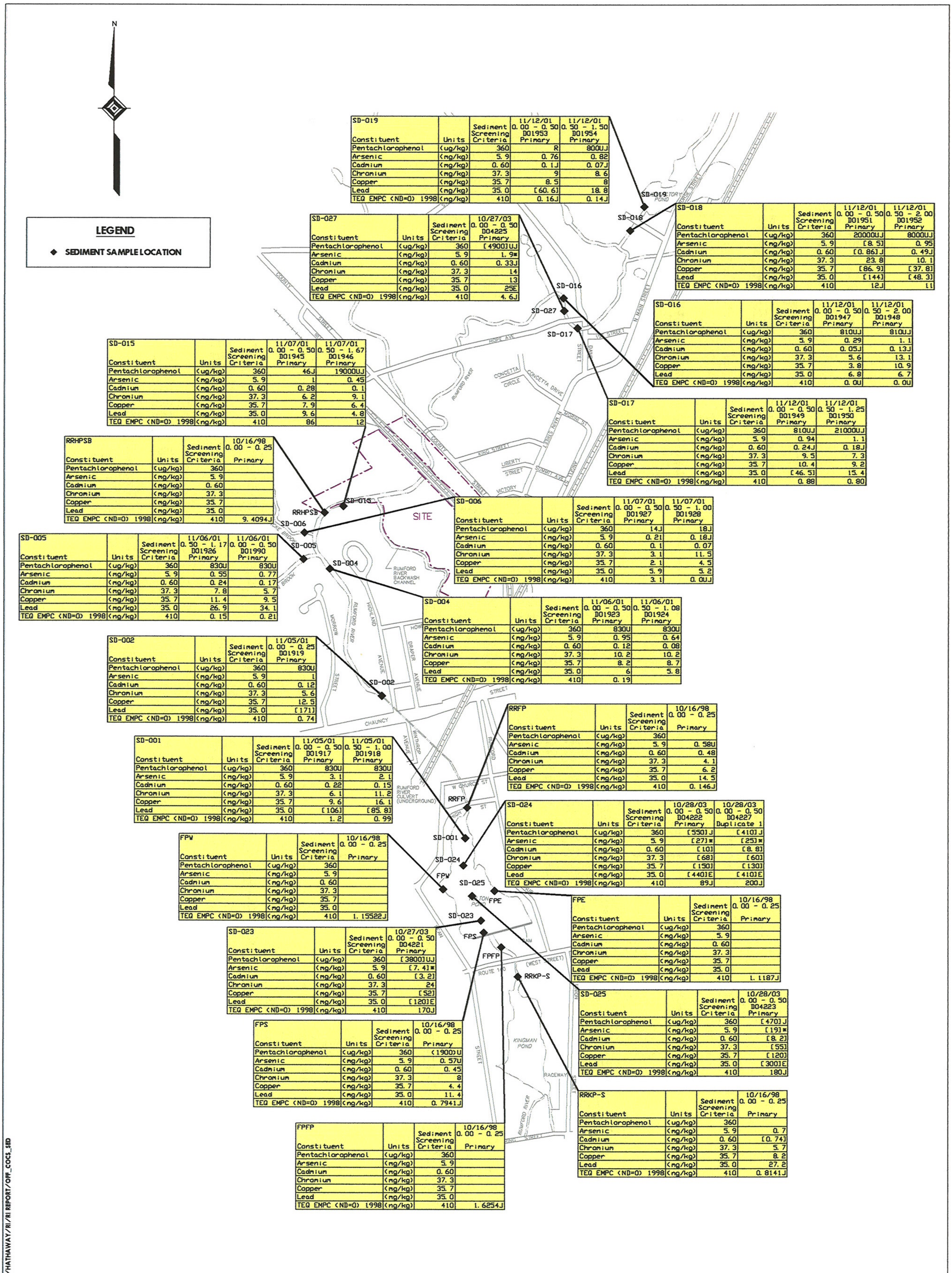
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



SD-019 Constituent	Units	Sediment Screening Criteria	11/12/01 0.00 - 0.50 D01953 Primary	11/12/01 0.50 - 1.50 D01954 Primary
Pentachlorophenol	(ug/kg)	360	R	800UJ
Arsenic	(mg/kg)	5.9	0.76	0.82
Cadmium	(mg/kg)	0.60	0.1J	0.07J
Chromium	(mg/kg)	37.3	9	8.6
Copper	(mg/kg)	35.7	8.5	8
Lead	(mg/kg)	35.0	[60.6]	18.8
TEQ EMPC (ND=0) 1998	(ng/kg)	410	0.16J	0.14J

SD-018 Constituent	Units	Sediment Screening Criteria	11/12/01 0.00 - 0.50 D01951 Primary	11/12/01 0.50 - 2.00 D01952 Primary
Pentachlorophenol	(ug/kg)	360	20000UJ	8000UJ
Arsenic	(mg/kg)	5.9	[8.5]	0.95
Cadmium	(mg/kg)	0.60	[0.86]J	0.49J
Chromium	(mg/kg)	37.3	23.8	10.1
Copper	(mg/kg)	35.7	[86.9]	[37.8]
Lead	(mg/kg)	35.0	[144]	[48.3]
TEQ EMPC (ND=0) 1998	(ng/kg)	410	12J	11

SD-027 Constituent	Units	Sediment Screening Criteria	10/27/03 0.00 - 0.50 D04225 Primary
Pentachlorophenol	(ug/kg)	360	[4900]UJ
Arsenic	(mg/kg)	5.9	1.9*
Cadmium	(mg/kg)	0.60	0.33J
Chromium	(mg/kg)	37.3	14
Copper	(mg/kg)	35.7	13
Lead	(mg/kg)	35.0	25E
TEQ EMPC (ND=0) 1998	(ng/kg)	410	4.6J

SD-016 Constituent	Units	Sediment Screening Criteria	11/12/01 0.00 - 0.50 D01947 Primary	11/12/01 0.50 - 2.00 D01948 Primary
Pentachlorophenol	(ug/kg)	360	810UJ	810UJ
Arsenic	(mg/kg)	5.9	0.29	1.1
Cadmium	(mg/kg)	0.60	0.05J	0.13J
Chromium	(mg/kg)	37.3	5.6	13.1
Copper	(mg/kg)	35.7	3.8	10.9
Lead	(mg/kg)	35.0	6.8	6.7
TEQ EMPC (ND=0) 1998	(ng/kg)	410	0.0U	0.0U

SD-015 Constituent	Units	Sediment Screening Criteria	11/07/01 0.00 - 0.50 D01945 Primary	11/07/01 0.50 - 1.67 D01946 Primary
Pentachlorophenol	(ug/kg)	360	46J	19000UJ
Arsenic	(mg/kg)	5.9	1	0.45
Cadmium	(mg/kg)	0.60	0.28	0.1
Chromium	(mg/kg)	37.3	6.2	9.1
Copper	(mg/kg)	35.7	7.9	6.4
Lead	(mg/kg)	35.0	9.6	4.8
TEQ EMPC (ND=0) 1998	(ng/kg)	410	86	12

SD-017 Constituent	Units	Sediment Screening Criteria	11/12/01 0.00 - 0.50 D01949 Primary	11/12/01 0.50 - 1.25 D01950 Primary
Pentachlorophenol	(ug/kg)	360	810UJ	21000UJ
Arsenic	(mg/kg)	5.9	0.94	1.1
Cadmium	(mg/kg)	0.60	0.24J	0.18J
Chromium	(mg/kg)	37.3	9.5	7.3
Copper	(mg/kg)	35.7	10.4	9.2
Lead	(mg/kg)	35.0	[46.5]J	15.4
TEQ EMPC (ND=0) 1998	(ng/kg)	410	0.88	0.80

RRHPSB Constituent	Units	Sediment Screening Criteria	10/16/98 0.00 - 0.25 Primary
Pentachlorophenol	(ug/kg)	360	
Arsenic	(mg/kg)	5.9	
Cadmium	(mg/kg)	0.60	
Chromium	(mg/kg)	37.3	
Copper	(mg/kg)	35.7	
Lead	(mg/kg)	35.0	
TEQ EMPC (ND=0) 1998	(ng/kg)	410	9.4094J

SD-006 Constituent	Units	Sediment Screening Criteria	11/07/01 0.00 - 0.50 D01927 Primary	11/07/01 0.50 - 1.00 D01928 Primary
Pentachlorophenol	(ug/kg)	360	14J	18J
Arsenic	(mg/kg)	5.9	0.21	0.18J
Cadmium	(mg/kg)	0.60	0.1	0.07
Chromium	(mg/kg)	37.3	3.1	11.5
Copper	(mg/kg)	35.7	2.1	4.5
Lead	(mg/kg)	35.0	5.9	5.2
TEQ EMPC (ND=0) 1998	(ng/kg)	410	3.1	0.0UJ

SD-005 Constituent	Units	Sediment Screening Criteria	11/06/01 0.50 - 1.17 D01926 Primary	11/06/01 0.00 - 0.50 D01990 Primary
Pentachlorophenol	(ug/kg)	360	830U	830U
Arsenic	(mg/kg)	5.9	0.55	0.77
Cadmium	(mg/kg)	0.60	0.24	0.17
Chromium	(mg/kg)	37.3	7.8	5.7
Copper	(mg/kg)	35.7	11.4	9.5
Lead	(mg/kg)	35.0	26.9	34.1
TEQ EMPC (ND=0) 1998	(ng/kg)	410	0.15	0.21

SD-004 Constituent	Units	Sediment Screening Criteria	11/06/01 0.00 - 0.50 D01923 Primary	11/06/01 0.50 - 1.08 D01924 Primary
Pentachlorophenol	(ug/kg)	360	830U	830U
Arsenic	(mg/kg)	5.9	0.95	0.64
Cadmium	(mg/kg)	0.60	0.12	0.08
Chromium	(mg/kg)	37.3	10.2	10.2
Copper	(mg/kg)	35.7	8.2	8.7
Lead	(mg/kg)	35.0	6	5.8
TEQ EMPC (ND=0) 1998	(ng/kg)	410	0.19	

SD-002 Constituent	Units	Sediment Screening Criteria	11/05/01 0.00 - 0.25 D01919 Primary
Pentachlorophenol	(ug/kg)	360	830U
Arsenic	(mg/kg)	5.9	1
Cadmium	(mg/kg)	0.60	0.12
Chromium	(mg/kg)	37.3	5.6
Copper	(mg/kg)	35.7	12.5
Lead	(mg/kg)	35.0	[171]
TEQ EMPC (ND=0) 1998	(ng/kg)	410	0.74

RRFP Constituent	Units	Sediment Screening Criteria	10/16/98 0.00 - 0.25 Primary
Pentachlorophenol	(ug/kg)	360	
Arsenic	(mg/kg)	5.9	0.58U
Cadmium	(mg/kg)	0.60	0.48
Chromium	(mg/kg)	37.3	4.1
Copper	(mg/kg)	35.7	6.2
Lead	(mg/kg)	35.0	14.5
TEQ EMPC (ND=0) 1998	(ng/kg)	410	0.146J

SD-001 Constituent	Units	Sediment Screening Criteria	11/05/01 0.00 - 0.50 D01917 Primary	11/05/01 0.50 - 1.00 D01918 Primary
Pentachlorophenol	(ug/kg)	360	830U	830U
Arsenic	(mg/kg)	5.9	3.1	2.1
Cadmium	(mg/kg)	0.60	0.22	0.15
Chromium	(mg/kg)	37.3	6.1	11.2
Copper	(mg/kg)	35.7	9.6	16.1
Lead	(mg/kg)	35.0	[106]	[85.8]
TEQ EMPC (ND=0) 1998	(ng/kg)	410	1.2	0.99

SD-024 Constituent	Units	Sediment Screening Criteria	10/28/03 0.00 - 0.50 D04222 Primary	10/28/03 0.00 - 0.50 D04227 Duplicate 1
Pentachlorophenol	(ug/kg)	360	[550]J	[410]J
Arsenic	(mg/kg)	5.9	[27]*	[25]*
Cadmium	(mg/kg)	0.60	[10]	[8.8]
Chromium	(mg/kg)	37.3	[68]	[60]
Copper	(mg/kg)	35.7	[150]	[130]
Lead	(mg/kg)	35.0	[440]E	[410]E
TEQ EMPC (ND=0) 1998	(ng/kg)	410	89J	200J

FPW Constituent	Units	Sediment Screening Criteria	10/16/98 0.00 - 0.25 Primary
Pentachlorophenol	(ug/kg)	360	
Arsenic	(mg/kg)	5.9	
Cadmium	(mg/kg)	0.60	
Chromium	(mg/kg)	37.3	
Copper	(mg/kg)	35.7	
Lead	(mg/kg)	35.0	
TEQ EMPC (ND=0) 1998	(ng/kg)	410	1.15522J

FPE Constituent	Units	Sediment Screening Criteria	10/16/98 0.00 - 0.25 Primary
Pentachlorophenol	(ug/kg)	360	
Arsenic	(mg/kg)	5.9	
Cadmium	(mg/kg)	0.60	
Chromium	(mg/kg)	37.3	
Copper	(mg/kg)	35.7	
Lead	(mg/kg)	35.0	
TEQ EMPC (ND=0) 1998	(ng/kg)	410	1.1187J

SD-023 Constituent	Units	Sediment Screening Criteria	10/27/03 0.00 - 0.50 D04221 Primary
Pentachlorophenol	(ug/kg)	360	[3800]UJ
Arsenic	(mg/kg)	5.9	[7.4]*
Cadmium	(mg/kg)	0.60	[3.2]
Chromium	(mg/kg)	37.3	24
Copper	(mg/kg)	35.7	[52]
Lead	(mg/kg)	35.0	[120]E
TEQ EMPC (ND=0) 1998	(ng/kg)	410	170J

SD-025 Constituent	Units	Sediment Screening Criteria	10/28/03 0.00 - 0.50 D04223 Primary
Pentachlorophenol	(ug/kg)	360	[470]J
Arsenic	(mg/kg)	5.9	[19]*
Cadmium	(mg/kg)	0.60	[8.2]
Chromium	(mg/kg)	37.3	[55]
Copper	(mg/kg)	35.7	[120]
Lead	(mg/kg)	35.0	[300]E
TEQ EMPC (ND=0) 1998	(ng/kg)	410	180J

FPS Constituent	Units	Sediment Screening Criteria	10/16/98 0.00 - 0.25 Primary
Pentachlorophenol	(ug/kg)	360	(1900)U
Arsenic	(mg/kg)	5.9	0.57U
Cadmium	(mg/kg)	0.60	0.45
Chromium	(mg/kg)	37.3	8
Copper	(mg/kg)	35.7	4.4
Lead	(mg/kg)	35.0	11.4
TEQ EMPC (ND=0) 1998	(ng/kg)	410	0.7941J

RRKP-S Constituent	Units	Sediment Screening Criteria	10/16/98 0.00 - 0.25 Primary
Pentachlorophenol	(ug/kg)	360	
Arsenic	(mg/kg)	5.9	0.7
Cadmium	(mg/kg)	0.60	[0.74]
Chromium	(mg/kg)	37.3	5.7
Copper	(mg/kg)	35.7	8.2
Lead	(mg/kg)	35.0	27.2
TEQ EMPC (ND=0) 1998	(ng/kg)	410	0.8141J

FPFP Constituent	Units	Sediment Screening Criteria	10/16/98 0.00 - 0.25 Primary
Pentachlorophenol	(ug/kg)	360	
Arsenic	(mg/kg)	5.9	
Cadmium	(mg/kg)	0.60	
Chromium	(mg/kg)	37.3	
Copper	(mg/kg)	35.7	
Lead	(mg/kg)	35.0	
TEQ EMPC (ND=0) 1998	(ng/kg)	410	1.6254J

DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT
UJ = ESTIMATED NONDETECT
J = ESTIMATED VALUE
* = DUPLICATE ANALYSIS NOT WITHIN CONTROL LIMITS
[ ] = EXCEEDS SCREENING CRITERIA
E = ESTIMATED VALUE DUE TO INTERFERENCE

0 500 1000 1500 2000

SCALE IN FEET

FIGURE 4.3-1

COCs IN OFF-SITE SEDIMENT

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

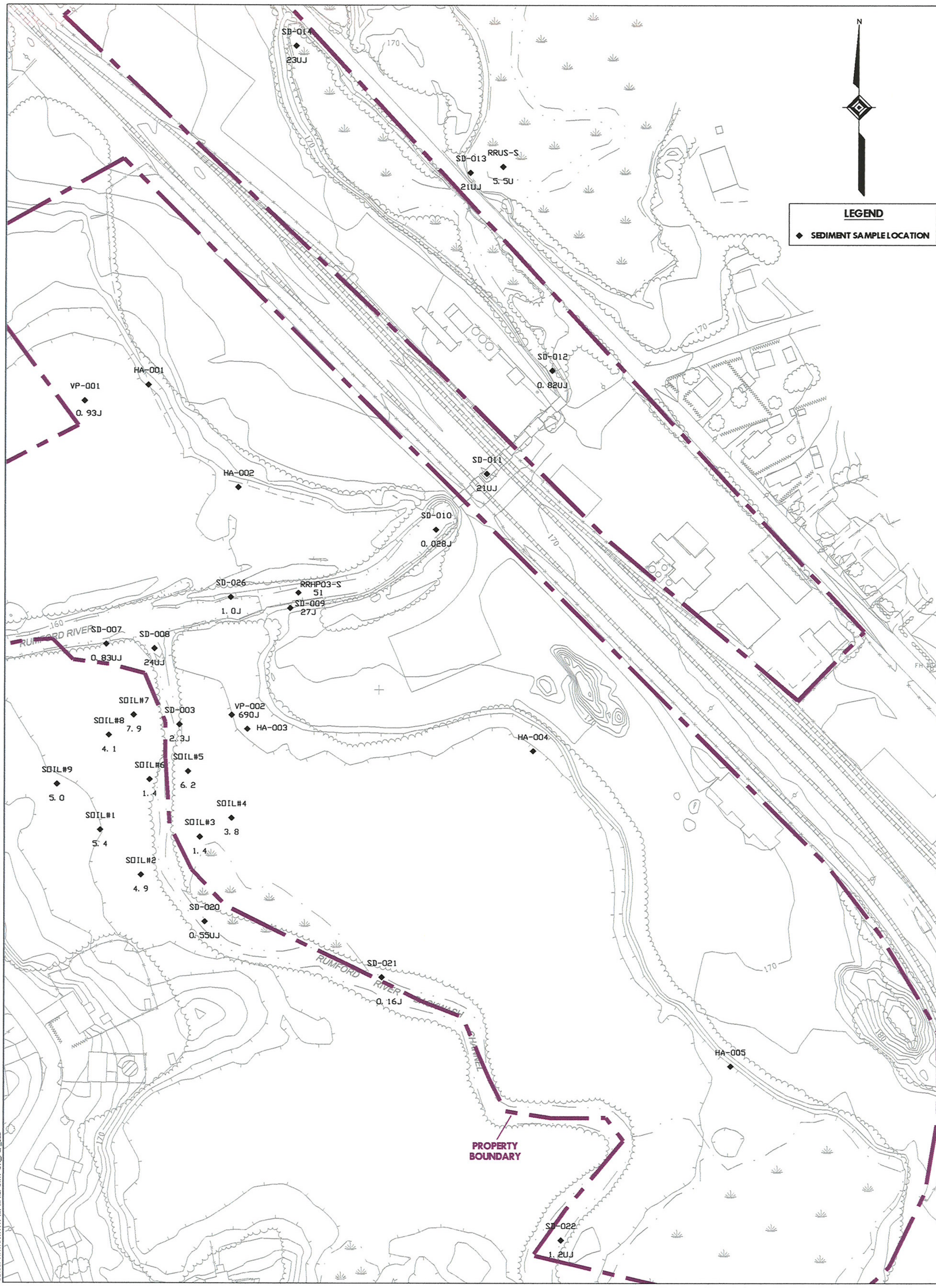
Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



02136/HATHAWAY/RI REPORT/ON_PCP_SED

DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT
UJ = ESTIMATED NONDETECT
J = ESTIMATED VALUE

0 75 150 225 300

SCALE IN FEET

FIGURE 4.3-2
PCP IN ON-SITE SEDIMENT (mg/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

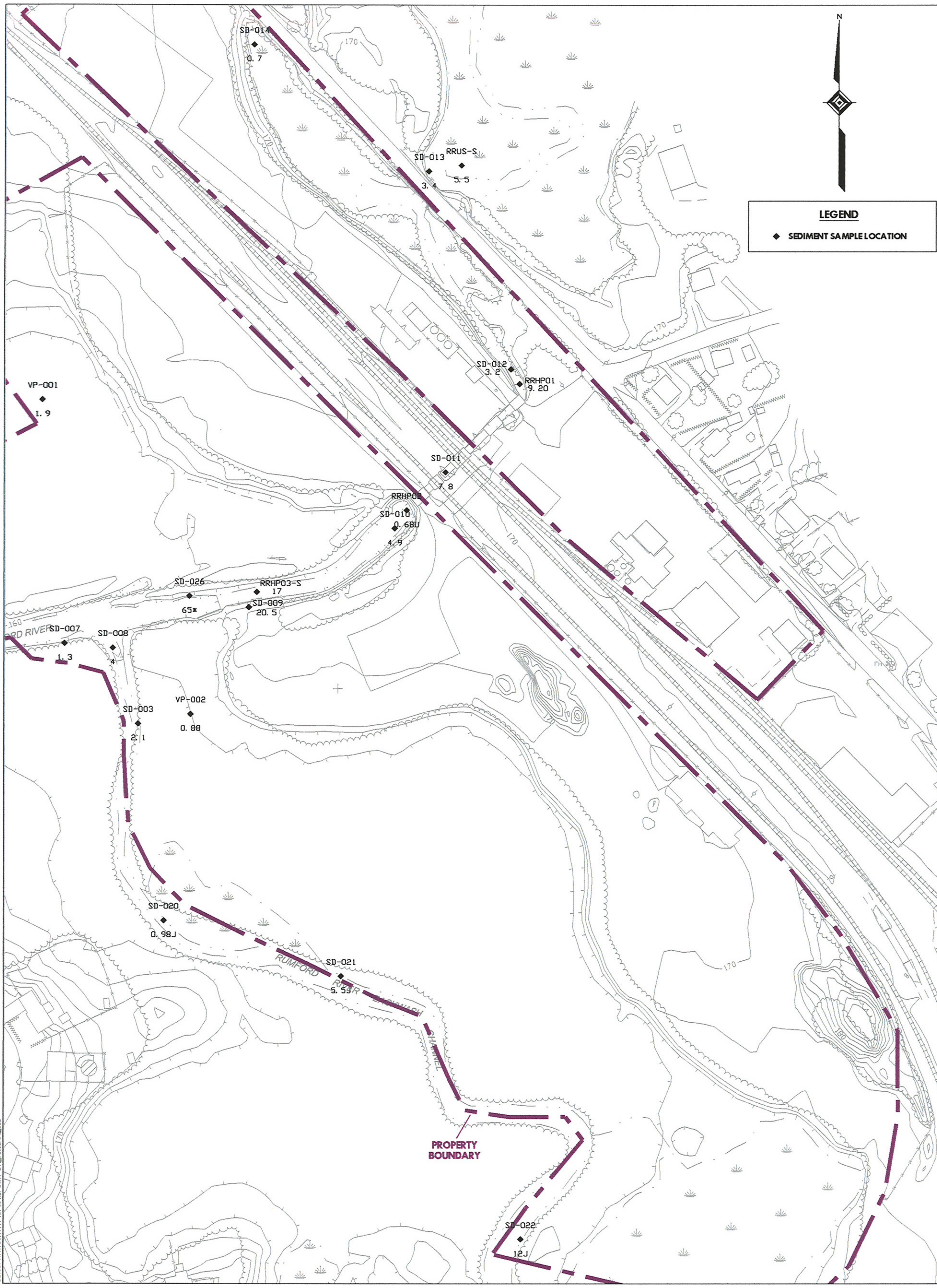
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



02136/HATHAWAY/RI REPORT/ON_ARSENIC_SED

DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT

* = DUPLICATE ANALYSIS NOT WITHIN CONTROL LIMITS

J = ESTIMATED VALUE

0 75 150 225 300

SCALE IN FEET

FIGURE 4.3-3

ARSENIC IN ON-SITE SEDIMENT (mg/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

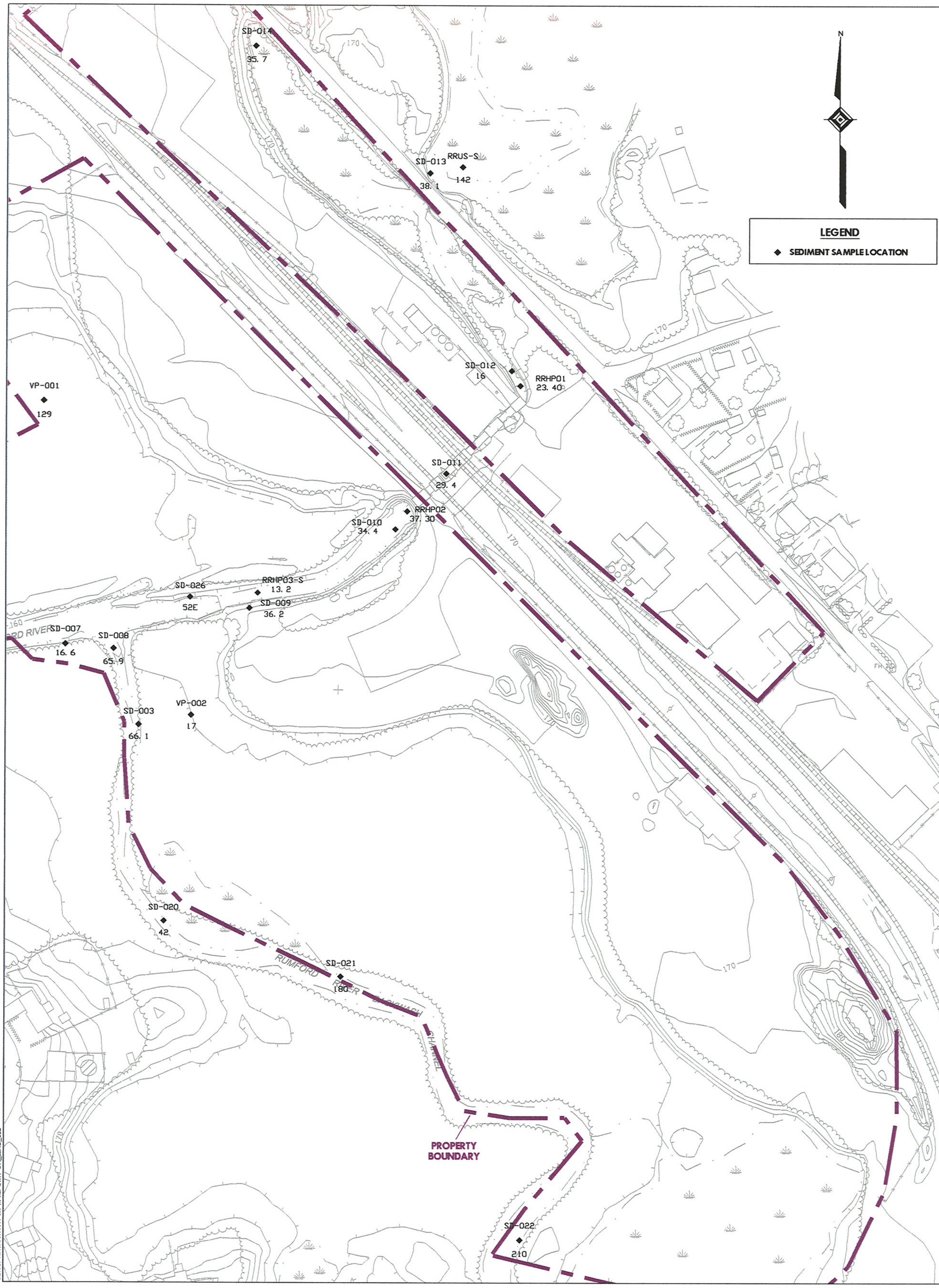
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



02136/HATHAWAY/RI/RI REPORT/ON_LEAD_SED

DATA QUALIFIERS:

E = ESTIMATED VALUE DUE TO INTERFERENCE

0 75 150 225 300

SCALE IN FEET

FIGURE 4.3–4
LEAD IN ON–SITE SEDIMENT
(mg/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

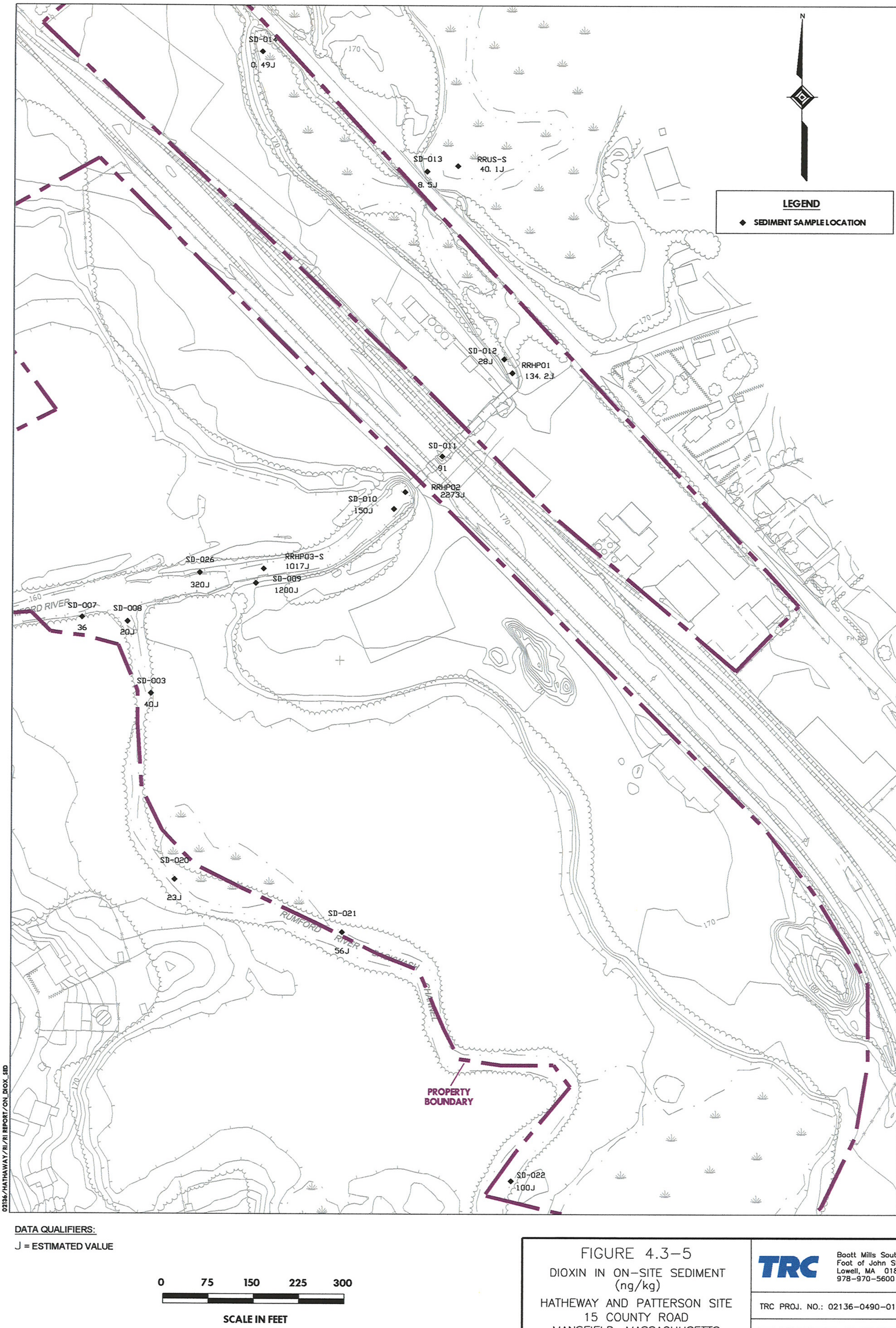
Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978–970–5600

TRC PROJ. NO.: 02136–0490–01X39

EPA CONTRACT NO.: 68–W6–0042

RAC SUBCONTRACT NO.: 107061



DATA QUALIFIERS:

J = ESTIMATED VALUE

FIGURE 4.3–5

DIOXIN IN ON–SITE SEDIMENT (ng/kg)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

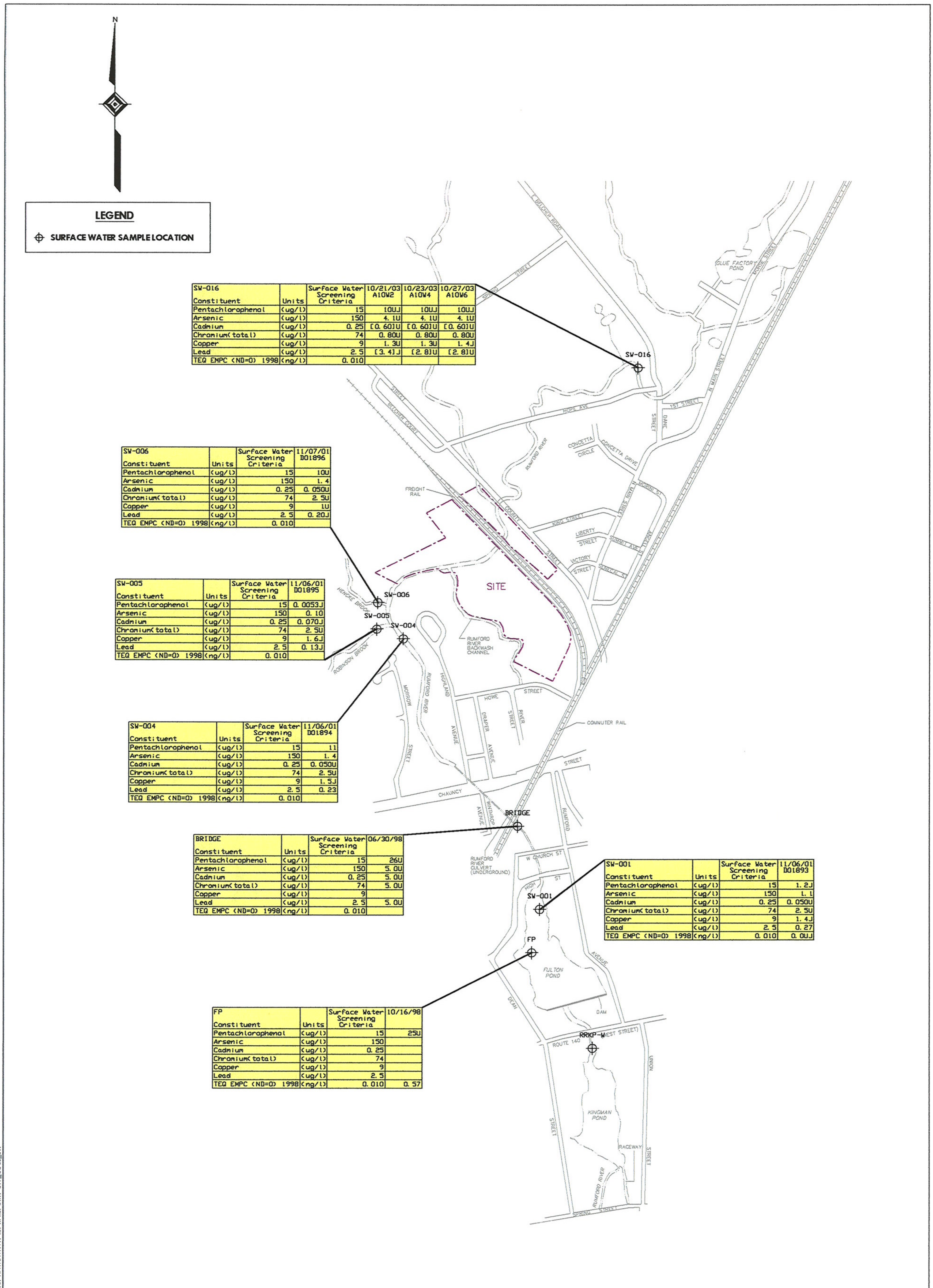
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978–970–5600

TRC PROJ. NO.: 02136–0490–01X39

EPA CONTRACT NO.: 68–W6–0042

RAC SUBCONTRACT NO.: 107061



SW-016 Constituent	Units	Surface Water Screening Criteria	10/21/03 A10W2	10/23/03 A10W4	10/27/03 A10W6
Pentachlorophenol	(ug/l)	15	10UJ	10UJ	10UJ
Arsenic	(ug/l)	150	4.1U	4.1U	4.1U
Cadmium	(ug/l)	0.25	[0.60]U	[0.60]U	[0.60]U
Chromium(total)	(ug/l)	74	0.80U	0.80U	0.80U
Copper	(ug/l)	9	1.3U	1.3U	1.4J
Lead	(ug/l)	2.5	[3.4]J	[2.8]U	[2.8]U
TEQ EMPC (ND=0) 1998	(ng/l)	0.010			

SW-006 Constituent	Units	Surface Water Screening Criteria	11/07/01 D01896
Pentachlorophenol	(ug/l)	15	10U
Arsenic	(ug/l)	150	1.4
Cadmium	(ug/l)	0.25	0.050U
Chromium(total)	(ug/l)	74	2.5U
Copper	(ug/l)	9	1U
Lead	(ug/l)	2.5	0.20J
TEQ EMPC (ND=0) 1998	(ng/l)	0.010	

SW-005 Constituent	Units	Surface Water Screening Criteria	11/06/01 D01895
Pentachlorophenol	(ug/l)	15	0.0053J
Arsenic	(ug/l)	150	0.10
Cadmium	(ug/l)	0.25	0.070J
Chromium(total)	(ug/l)	74	2.5U
Copper	(ug/l)	9	1.6J
Lead	(ug/l)	2.5	0.13J
TEQ EMPC (ND=0) 1998	(ng/l)	0.010	

SW-004 Constituent	Units	Surface Water Screening Criteria	11/06/01 D01894
Pentachlorophenol	(ug/l)	15	11
Arsenic	(ug/l)	150	1.4
Cadmium	(ug/l)	0.25	0.050U
Chromium(total)	(ug/l)	74	2.5U
Copper	(ug/l)	9	1.5J
Lead	(ug/l)	2.5	0.23
TEQ EMPC (ND=0) 1998	(ng/l)	0.010	

BRIDGE Constituent	Units	Surface Water Screening Criteria	06/30/98
Pentachlorophenol	(ug/l)	15	26U
Arsenic	(ug/l)	150	5.0U
Cadmium	(ug/l)	0.25	5.0U
Chromium(total)	(ug/l)	74	5.0U
Copper	(ug/l)	9	
Lead	(ug/l)	2.5	5.0U
TEQ EMPC (ND=0) 1998	(ng/l)	0.010	

SW-001 Constituent	Units	Surface Water Screening Criteria	11/06/01 D01893
Pentachlorophenol	(ug/l)	15	1.2J
Arsenic	(ug/l)	150	1.1
Cadmium	(ug/l)	0.25	0.050U
Chromium(total)	(ug/l)	74	2.5U
Copper	(ug/l)	9	1.4J
Lead	(ug/l)	2.5	0.27
TEQ EMPC (ND=0) 1998	(ng/l)	0.010	0.0UJ

FP Constituent	Units	Surface Water Screening Criteria	10/16/98
Pentachlorophenol	(ug/l)	15	25U
Arsenic	(ug/l)	150	
Cadmium	(ug/l)	0.25	
Chromium(total)	(ug/l)	74	
Copper	(ug/l)	9	
Lead	(ug/l)	2.5	
TEQ EMPC (ND=0) 1998	(ng/l)	0.010	0.57

02136/HATHAWAY/RI/RI REPORT/OFF_COCS_SW

DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT
UJ = ESTIMATED NONDETECT
J = ESTIMATED VALUE
[ ] = EXCEEDS SCREENING CRITERIA

0 500 1000 1500 2000

SCALE IN FEET

FIGURE 4.4-1

COCs IN OFF-SITE SURFACE WATER

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

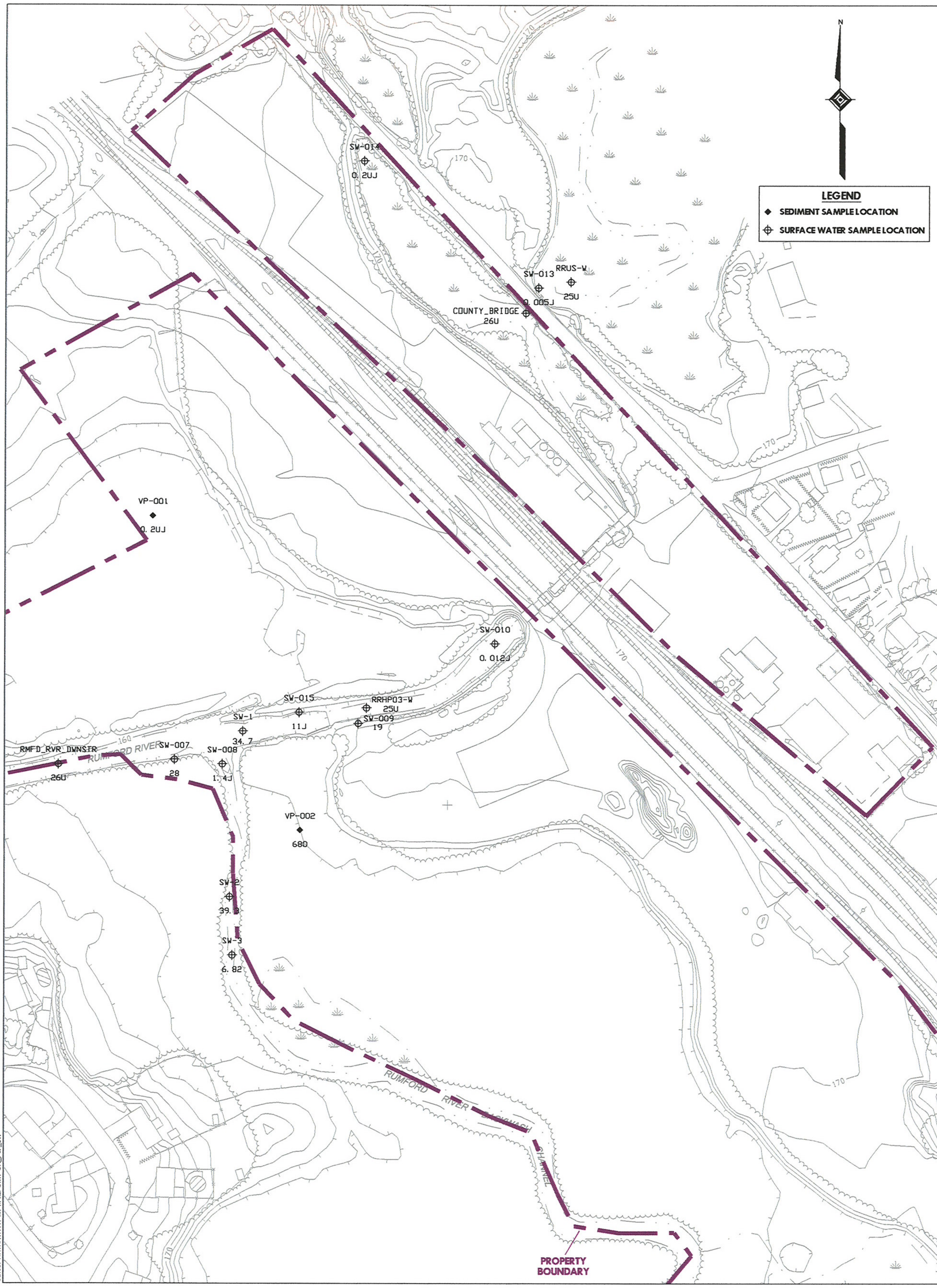
Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



02136/HATHAWAY/RI/RI REPORT/ON_PCP_SW

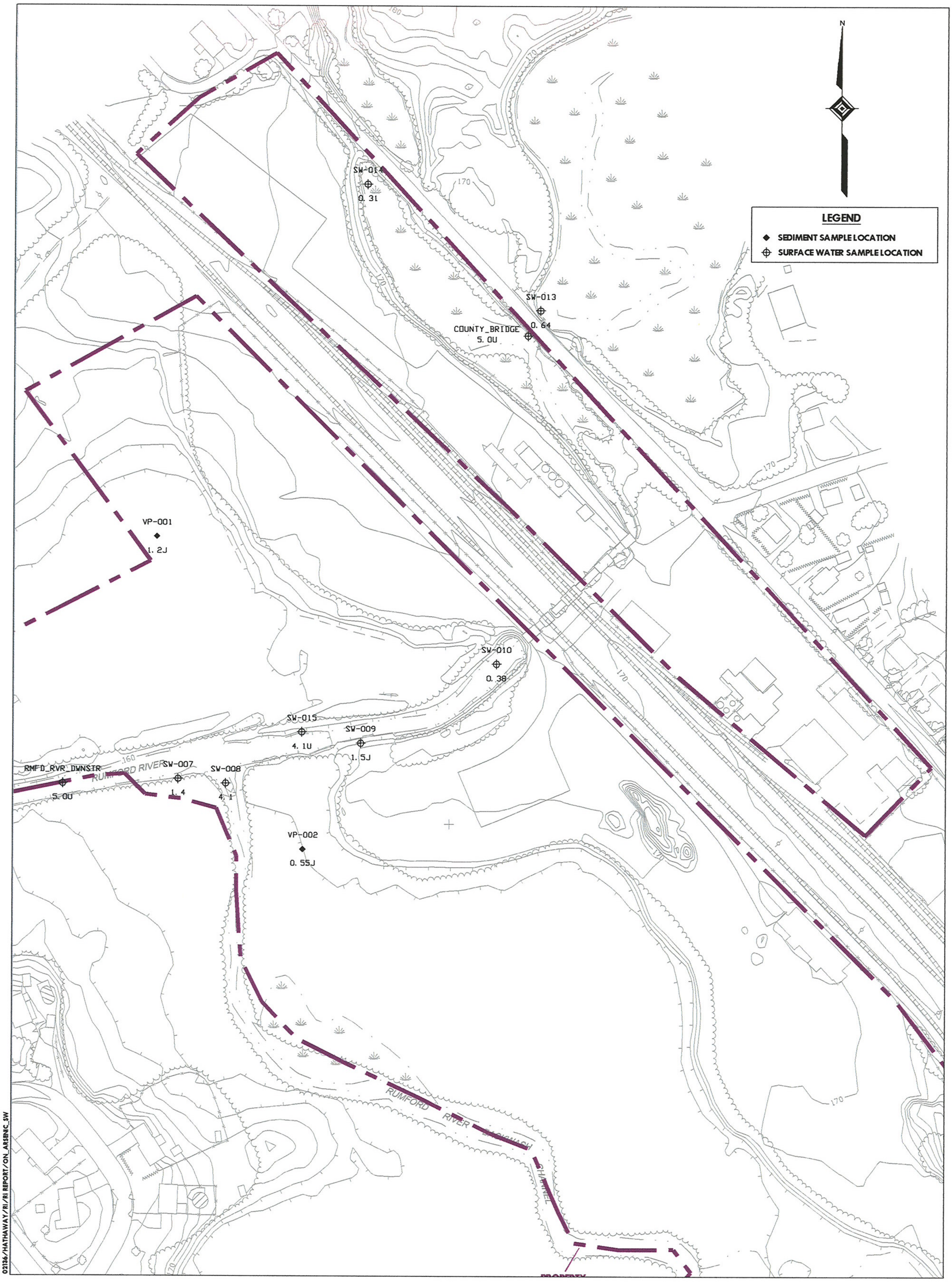
DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT
UJ = ESTIMATED NONDETECT
J = ESTIMATED VALUE

0 75 150 225 300

SCALE IN FEET

FIGURE 4.4–2 PCP IN ON–SITE SURFACE WATER (µg/l)	TRC Boott Mills South, Foot of John Street, Lowell, MA 01852, 978-970-5600
HATHEWAY AND PATTERSON SITE 15 COUNTY ROAD MANSFIELD, MASSACHUSETTS	TRC PROJ. NO.: 02136–0490–01X39 EPA CONTRACT NO.: 68–W6–0042
M&E Metcalf & Eddy	RAC SUBCONTRACT NO.: 107061



DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT

J = ESTIMATED VALUE

0 75 150 225 300

SCALE IN FEET

FIGURE 4.4–3

ARSENIC IN ON–SITE SURFACE WATER (µg/l)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

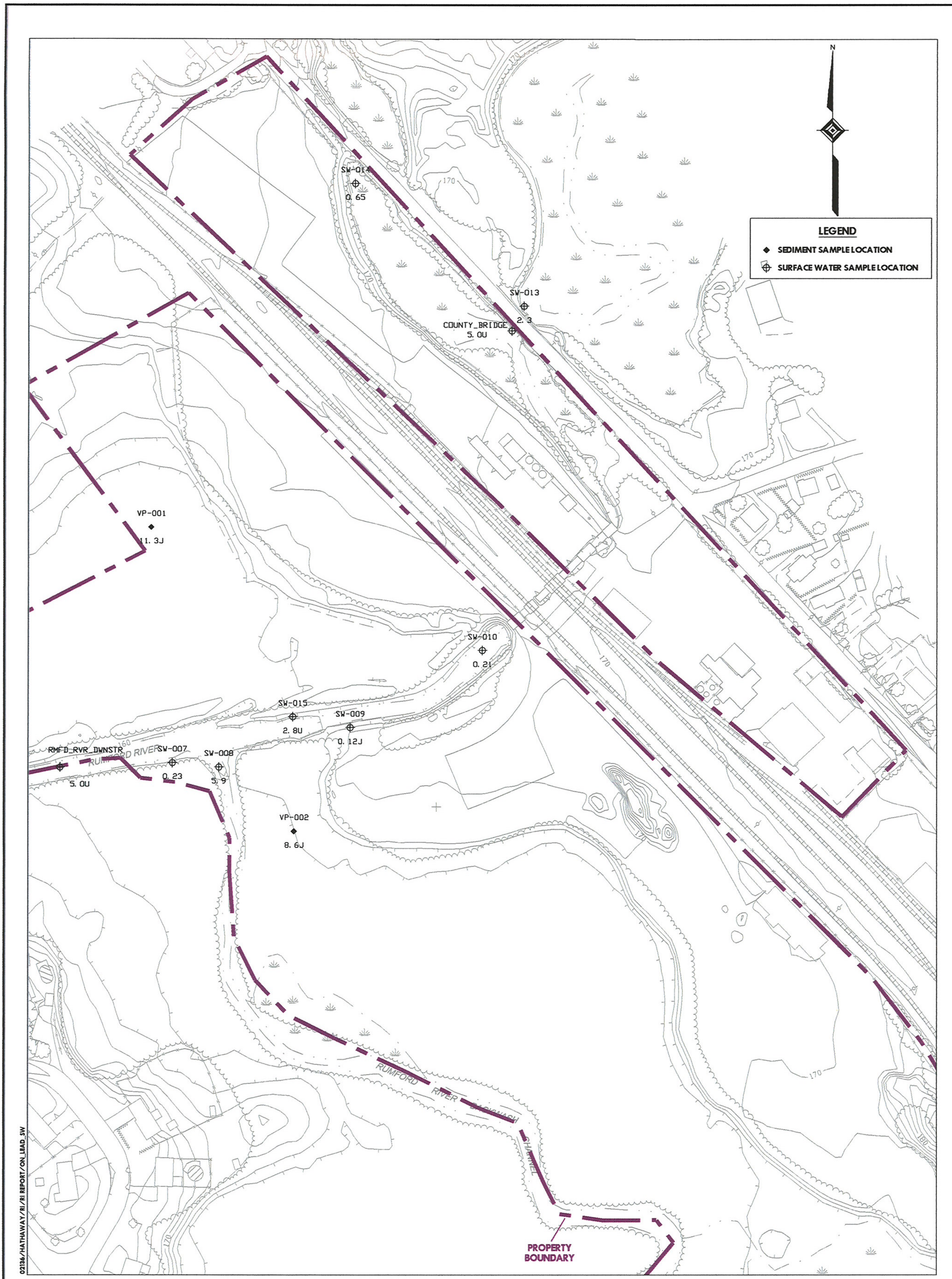
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978–970–5600

TRC PROJ. NO.: 02136–0490–01X39

EPA CONTRACT NO.: 68–W6–0042

RAC SUBCONTRACT NO.: 107061



DATA QUALIFIERS:

U = UNDETECTED AT THE SPECIFIED DETECTION LIMIT
J = ESTIMATED VALUE

0 75 150 225 300

SCALE IN FEET

FIGURE 4.4-4
LEAD IN ON-SITE SURFACE WATER
(μg/l)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

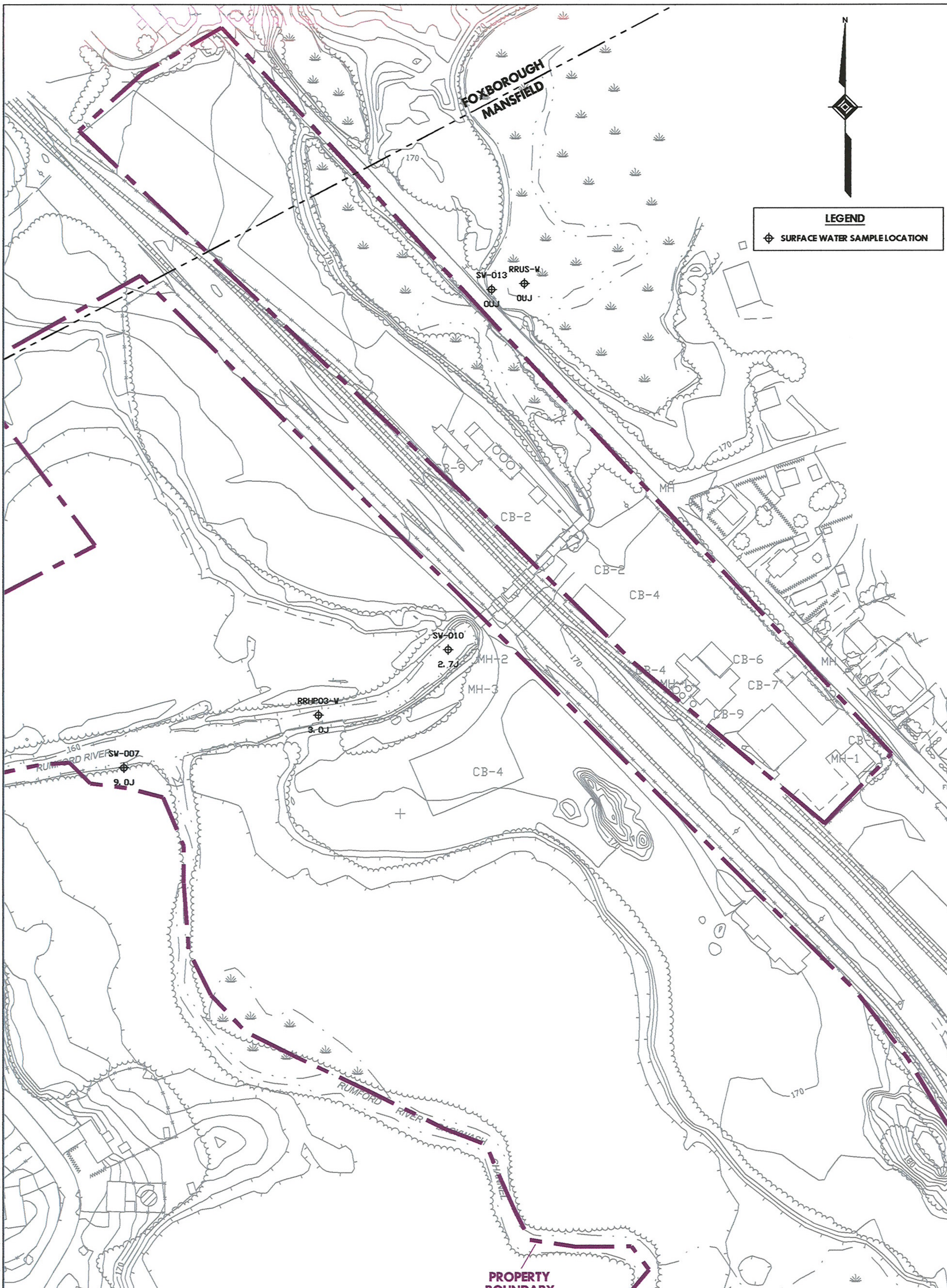
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



FILE: T:\E_CAD\02136\Hatheway\RI\RI REPORT\ON_DIOX_SW.DWG

DATA QUALIFIERS:

UJ = ESTIMATED NONDETECT
J = ESTIMATED VALUE

0 75 150 225 300

SCALE IN FEET

FIGURE 4.4-5
DIOXIN IN ON-SITE SURFACE WATER (ng/l)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

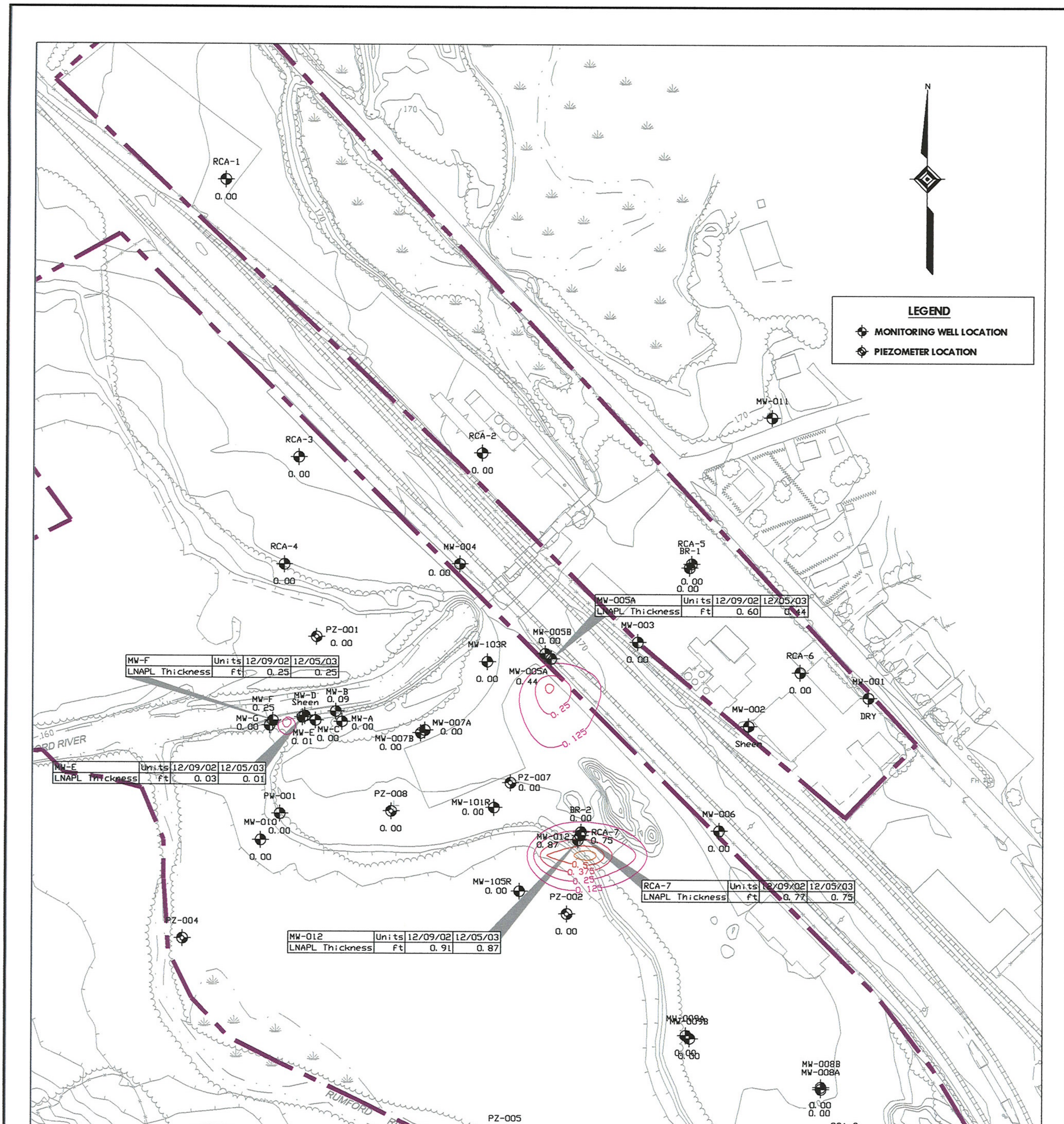
Metcalf & Eddy

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



0 75 150 225 300

SCALE IN FEET

FIGURE 4.5-1

LNAPL THICKNESS

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

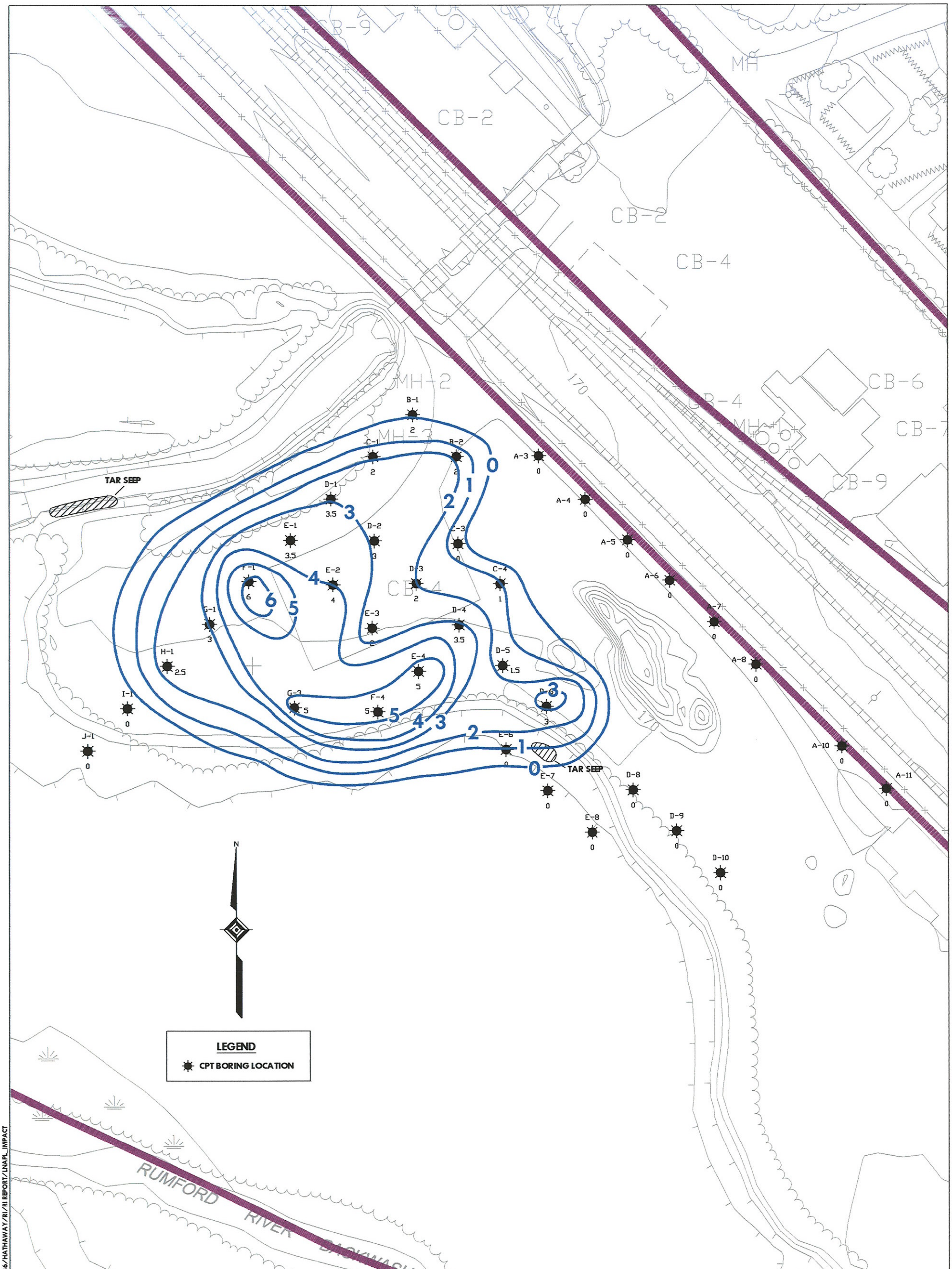
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



0 40 80 120 160

SCALE IN FEET

FIGURE 4.5–2

MAP OF LNAPL IMPACTED SOIL THICKNESS (FEET)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

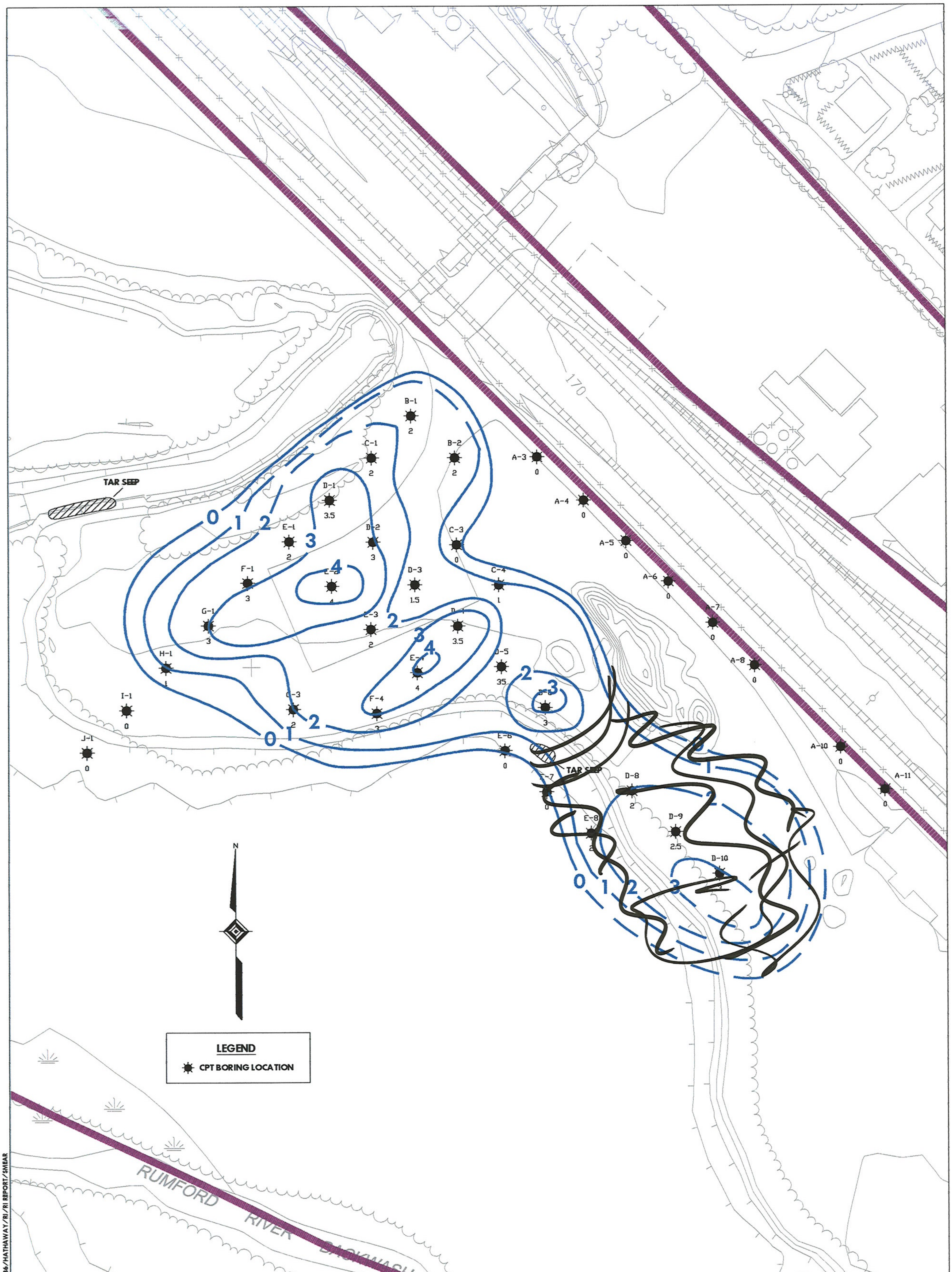
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



02136/HATHEWAY/RI/RI REPORT/SMEAR

0 40 80 120 160

SCALE IN FEET

FIGURE 4.5-2

SMEAR ZONE THICKNESS (FEET)

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

M&E Metcalf & Eddy

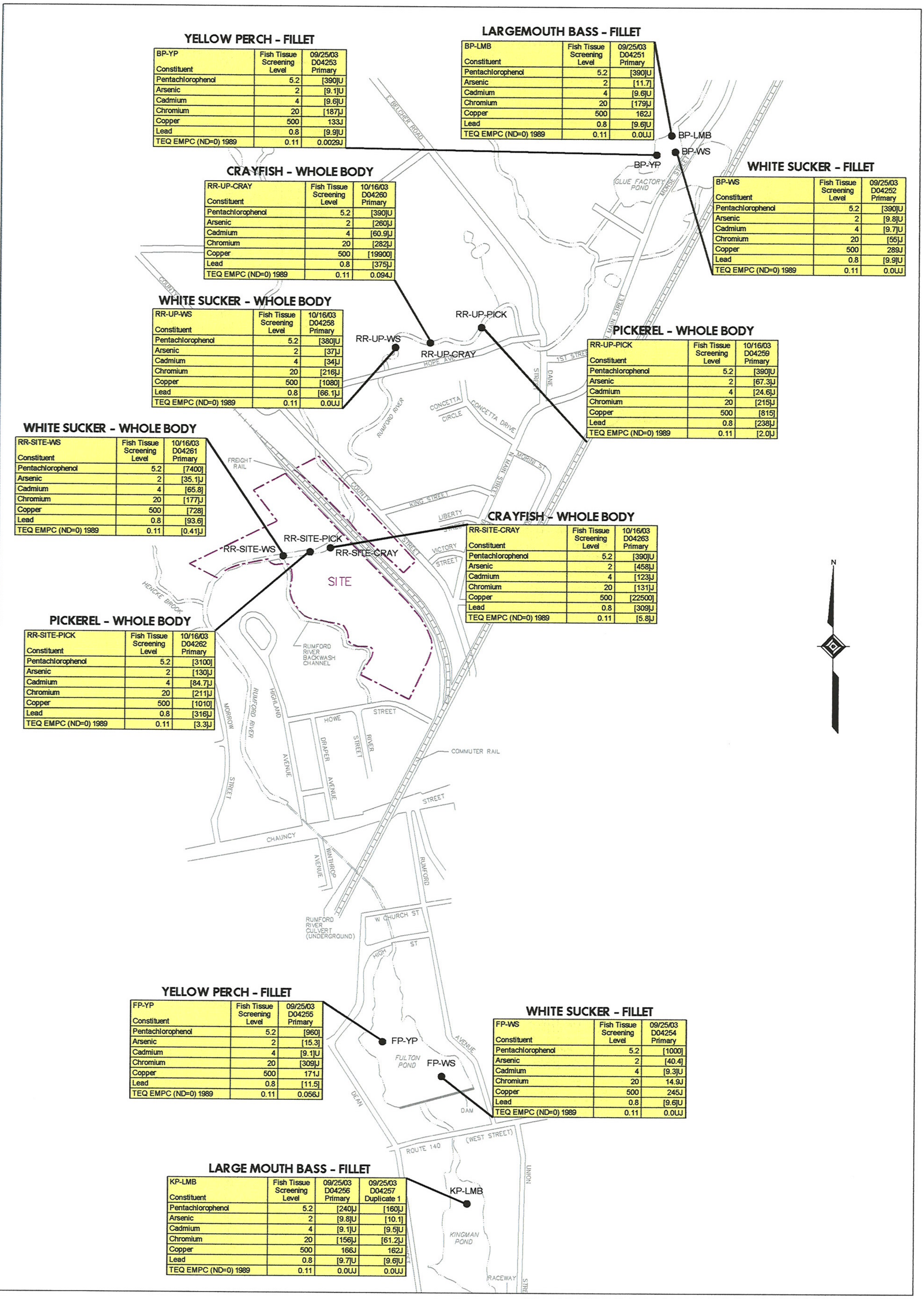
TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061



YELLOW PERCH - FILLET

BP-YP Constituent	Fish Tissue Screening Level	09/25/03 D04253 Primary
Pentachlorophenol	5.2	[390]U
Arsenic	2	[9.1]U
Cadmium	4	[9.6]U
Chromium	20	[187]J
Copper	500	133J
Lead	0.8	[9.9]U
TEQ EMPC (ND=0) 1989	0.11	0.0029J

LARGEMOUTH BASS - FILLET

BP-LMB Constituent	Fish Tissue Screening Level	09/25/03 D04251 Primary
Pentachlorophenol	5.2	[390]U
Arsenic	2	[11.7]
Cadmium	4	[9.6]U
Chromium	20	[179]J
Copper	500	162J
Lead	0.8	[9.6]U
TEQ EMPC (ND=0) 1989	0.11	0.0UJ

CRAYFISH - WHOLE BODY

RR-UP-CRAY Constituent	Fish Tissue Screening Level	10/16/03 D04260 Primary
Pentachlorophenol	5.2	[390]U
Arsenic	2	[260]J
Cadmium	4	[60.9]J
Chromium	20	[282]J
Copper	500	[19900]
Lead	0.8	[375]J
TEQ EMPC (ND=0) 1989	0.11	0.094J

WHITE SUCKER - FILLET

BP-WS Constituent	Fish Tissue Screening Level	09/25/03 D04252 Primary
Pentachlorophenol	5.2	[390]U
Arsenic	2	[9.8]U
Cadmium	4	[9.7]U
Chromium	20	[55]J
Copper	500	289J
Lead	0.8	[9.9]U
TEQ EMPC (ND=0) 1989	0.11	0.0UJ

WHITE SUCKER - WHOLE BODY

RR-UP-WS Constituent	Fish Tissue Screening Level	10/16/03 D04258 Primary
Pentachlorophenol	5.2	[380]U
Arsenic	2	[37]J
Cadmium	4	[34]J
Chromium	20	[216]J
Copper	500	[1080]
Lead	0.8	[66.1]J
TEQ EMPC (ND=0) 1989	0.11	0.0UJ

PICKEREL - WHOLE BODY

RR-UP-PICK Constituent	Fish Tissue Screening Level	10/16/03 D04259 Primary
Pentachlorophenol	5.2	[390]U
Arsenic	2	[67.3]J
Cadmium	4	[24.6]J
Chromium	20	[215]J
Copper	500	[815]
Lead	0.8	[238]J
TEQ EMPC (ND=0) 1989	0.11	[2.0]J

WHITE SUCKER - WHOLE BODY

RR-SITE-WS Constituent	Fish Tissue Screening Level	10/16/03 D04261 Primary
Pentachlorophenol	5.2	[7400]
Arsenic	2	[35.1]J
Cadmium	4	[65.8]
Chromium	20	[177]J
Copper	500	[728]
Lead	0.8	[93.6]
TEQ EMPC (ND=0) 1989	0.11	[0.41]J

CRAYFISH - WHOLE BODY

RR-SITE-CRAY Constituent	Fish Tissue Screening Level	10/16/03 D04263 Primary
Pentachlorophenol	5.2	[390]U
Arsenic	2	[458]J
Cadmium	4	[123]J
Chromium	20	[131]J
Copper	500	[22500]
Lead	0.8	[309]J
TEQ EMPC (ND=0) 1989	0.11	[5.8]J

PICKEREL - WHOLE BODY

RR-SITE-PICK Constituent	Fish Tissue Screening Level	10/16/03 D04262 Primary
Pentachlorophenol	5.2	[3100]
Arsenic	2	[130]J
Cadmium	4	[84.7]J
Chromium	20	[211]J
Copper	500	[1010]
Lead	0.8	[316]J
TEQ EMPC (ND=0) 1989	0.11	[3.3]J

YELLOW PERCH - FILLET

FP-YP Constituent	Fish Tissue Screening Level	09/25/03 D04255 Primary
Pentachlorophenol	5.2	[960]
Arsenic	2	[15.3]
Cadmium	4	[9.1]U
Chromium	20	[309]J
Copper	500	171J
Lead	0.8	[11.5]
TEQ EMPC (ND=0) 1989	0.11	0.056J

WHITE SUCKER - FILLET

FP-WS Constituent	Fish Tissue Screening Level	09/25/03 D04254 Primary
Pentachlorophenol	5.2	[1000]
Arsenic	2	[40.4]
Cadmium	4	[9.3]U
Chromium	20	14.9J
Copper	500	245J
Lead	0.8	[9.6]U
TEQ EMPC (ND=0) 1989	0.11	0.0UJ

LARGE MOUTH BASS - FILLET

KP-LMB Constituent	Fish Tissue Screening Level	09/25/03 D04256 Primary	09/25/03 D04257 Duplicate 1
Pentachlorophenol	5.2	[240]J	[160]J
Arsenic	2	[9.8]U	[10.1]
Cadmium	4	[9.1]U	[9.5]U
Chromium	20	[156]J	[61.2]J
Copper	500	166J	162J
Lead	0.8	[9.7]U	[9.6]U
TEQ EMPC (ND=0) 1989	0.11	0.0UJ	0.0UJ

0 400 800 1200 1600

SCALE IN FEET

FIGURE 4.6-1

COCs IN FISH TISSUE

HATHEWAY AND PATTERSON SITE
15 COUNTY ROAD
MANSFIELD, MASSACHUSETTS

Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0490-01X39

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACT NO.: 107061

02136/HATHAWAY/RI/RI REPORT/FISH_COCS